

# THE MONIST

A Quarterly Magazine

Devoted to the Philosophy of Science.

Editor: DR. PAUL CARUS.

Associates: { E. C. HEGLER.  
MARY CARUS.

## CONTENTS:

	PAGE
MOSES.	
C. H. CORNILL .....	161
THE DRAMATIC ELEMENT IN THE UPANISHADS.	
CHARLES JOHNSTON .....	185
A PHILOSOPHICAL ASPECT OF SCIENCE.	
G. O. WARREN .....	217
THE ROCK OF AGES.	
EDITOR .....	231
THE PSYCHOLOGICAL BASIS OF RELIGION.	
EDWARD SCRIBNER AMES .....	242
THE FOLLOWERS OF JESUS IN THE TALMUD.	
BERNHARD PICK .....	263
CRITICISMS AND DISCUSSIONS.	
Death and Resurrection. J. E. FRIES .....	279
Plato's "Idea" and Aristotle's "Entelechy" (With Editorial Comment). SAMUEL WARD BOARDMAN .....	297
A Magic Cube of Six. HARRY A. SAYLES .....	299
Magic Cube on Six. JOHN WORTHINGTON .....	303
Magic in the Fourth Dimension. H. M. KINGERY .....	309

CHICAGO

THE OPEN COURT PUBLISHING CO.

Price, 60 cents; Yearly, \$2.00

LONDON: Kegan Paul, Trench, Trübner & Co., Ltd.

In England and U. P. U., half a crown; Yearly, 9s 6d.

Entered as Second-Class Matter Oct. 10, 1890, at the Post Office at Chicago, Ill., under Act of March 3, 1879.  
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1910

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# THE MONIST

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MOSES.\*

ALL that is great and significant in humanity is accomplished by great and significant personalities. To be sure we have been warned against exaggerated personality worship or hero worship, and have been told that the so-called great men are nothing but the exponents of mighty currents and tendencies of their time. In this thought lies a certain truth, in so far as great men do not fall from heaven but require some connecting links: the time must be ripe for them, must to some extent have need of them, and on closer inspection we will usually discover that the currents and tendencies of their contemporaries have met them half way; but that these currents attained their aim, that these tendencies were actualized, is solely and simply due to the merit of the great men themselves, and therefore has earned for them the gratitude of humanity and of history which associates these events with their names.

What is thus true in general of all great men and significant human affairs is also very especially true of religion. For religion is life, the most personal life. It lives only in personalities and through personalities. All great and important events in the history of religion are ineradicably connected with the names of particularly favored

\* A lecture delivered at Breslau, October 19, 1908, as the first of a series of lectures on the four great founders of the world-religions. Translated from the German by Lydia G. Robinson.

personages who appeared to their contemporaries as prophets and apostles of God, who had himself taken possession of them and had become a living power within them.

Among these the founders of religion naturally stand in the first rank. They created something entirely new and consciously strove to lead their contemporaries on new religious paths and to bring them a divine truth which had previously been hidden from them. And as founders of world religions, Moses, Buddha, Mohammed and Jesus stand in the first rank.

The earliest of them is Moses. To him we stand in a very different relation from that in which we stand to Buddha or Mohammed. The latter men do not concern us directly and at best can have for us only a scientific objective interest. We are much more likely to see in them enemies and opponents of our Christian religion, its most dangerous rivals in the competition for the spiritual dominion of the world, while Moses and Jesus are in our minds inseparably connected. In Moses we see a direct predecessor of Jesus,—the point of departure of the great religious movement which has found its historical conclusion and spiritual perfection in Jesus. Sufficient reason to devote to this man our particular attention, and indeed our task of sketching him and his work is an especially fascinating and alluring one which will yield a rich reward.

Unfortunately, however, the undertaking is at the same time a very difficult one, and I must express myself with regard to it openly and without reservation. The difficulty lies in the nature of the sources at our command. Buddha and Mohammed stand before us in the full light of history in spite of the great amount of legendary material which attaches to their personalities. We can not say the same of Moses. But have we not the five books of Moses? Could we wish more or better material? It is only the German Bible that knows anything of the "Five

Books of Moses." The Hebrew, Greek, Latin and even the English Bibles do not ascribe these books expressly and directly to Moses. And in the last century and a half, science has worked so vigorously and persistently on just this so-called Pentateuch, that we are justified in speaking here of positive results.

The Pentateuch originated from the combination of various original documents, the oldest of which is perhaps half a millennium later than Moses, so that accordingly the earliest narratives of Moses and accounts of his work which have come down to us are further removed from him in time than we to-day are from Luther. But the Pentateuch, to be sure, contains not only narratives, but laws as well. Is it not possible that one or another of these legal constituents proceeded from Moses himself? In his historical tradition he is, of course, the law-giver *par excellence*! When it comes to an estimate of Moses's value for the history of religion, I must express myself frankly and honestly and must also substantiate statements which will probably seem most surprising to many of my readers.

It is my firm conviction that the science of Old Testament criticism of the last generation not only asserts but proves—proves positively, that the great coherent priestly code of the Pentateuch as it has found its characteristic stamp in the code of the tabernacle and in the so-called third book of Moses (Leviticus), is quite late, and does not belong at the beginning of the development as its foundation, but at the end as its culmination. That the coherent code presented in the so-called fifth book of Moses (Deuteronomy) originated in the seventh century was proved by De Wette as early as 1805, and this knowledge has become the common property of Old Testament science. We may leave out of consideration the three poetical pieces ascribed to Moses, his Song (Deut. xxxii. 1-43), his Blessing (Deut. xxxiii), and his Prayer (Psalm xc). Hence there are

only a few pieces of legal import which come seriously into question. These are the so-called Book of the Covenant (Exodus xxi-xxiii) and the Decalogue, or Decalogues, and both are to be found in the earliest original documents.

The Book of the Covenant is old beyond any doubt. It is the earliest attempt in Israel at a detailed formulation of law, and it has acquired a particular significance by the fact that it is this very code which shows most striking parallels to the famous codex, found in 1902, of the Babylonian king Hammurabi who dates back almost a thousand years earlier than Moses. But each closer investigation of the Book of the Covenant makes it more impossible to assume that Moses himself was its author. The work and legislation of Moses were intended for nomadic hordes which were yet to become a nation for the first time, and in whom we may not assume a settled state of civilization founded on agriculture. The whole legislation of the Covenant, however, is calculated for a settled agricultural population, to some extent also engaged in commerce and living under a sort of juridical administration. In the first place, the very detailed regulations about goring cattle are significant. In the Semitic Orient, cattle never and nowhere belong to nomad tribes but are exclusively domestic and farm animals; Semitic nomads raise only sheep and goats. Laws like those regarding injuries to field and vineyards from unrestrained cattle or the ravages of fire, or that fields, vineyards and olive groves should not be tilled the seventh year but should be left to the poor, have not Sinai for a background or the deserts of Kadesh, but the fertile land of Palestine. Then, too, when a regulation requires that the doer of a bodily injury which does not prove fatal must pay the injured one for the time he is bedridden, and also the cost of his recovery, we have a condition of society in which the daily wage can be calculated

in money, and in which professional physicians practise for money, which could never be the social condition of a nomad people even if it were no longer purely nomad but had already advanced to the most primitive agricultural stages. The Book of the Covenant was certainly drawn up at a comparatively early date. In it we can see the codification of customs in practice in the time of the earliest kings in the manner of the oldest German *Weis-thümer*; but Moses can not have given his contemporaries such a legislation.

We now come to the Decalogue, the Ten Commandments, in which we see the work which belongs peculiarly to Moses, and which occurs first to our minds when the name of Moses is mentioned. Because of the importance of the matter, I must here enter more into detail. It is first of all noteworthy that this Decalogue has left behind no traces whatever in the early and oldest literature. The earliest passage to be taken into account is in Hosea who says of his contemporaries that they swear, lie, kill, steal and commit adultery (Hosea iv. 2). But the prophet uses other words than those in the Decalogue, and furthermore the order of the sins is entirely different, so that this passage at least *need* not have reference to the Decalogue.

Moreover, it is well known that the Decalogue occurs twice in the Pentateuch in different forms (Exodus xx and Deut. v). The first, for instance, alleges as a reason for resting on the Sabbath, the rest of God on the seventh day after the six days employed in creating the world; the other, consideration for servants, in order that thy manservant and thy maidservant may rest as well as thou (Deut. v. 14). Of course this difficulty is not insurmountable, for on two stone tablets we must think of the ten commandments as formulated in lapidary briefness, perhaps as follows:

"Thou shalt have none other gods before me.

"Thou shalt not make thee any image or any likeness.

"Thou shalt not misuse the name of God.

"Thou shalt keep the Sabbath holy.

"Thou shalt honor father and mother."

But the gravest essential considerations arise against the possibility that even such a nucleus has come down directly from Moses. The Sabbath command and the image prohibition contain insurmountable difficulties. The Biblical celebration of the Sabbath consists everywhere in rest and cessation from labor. It has therefore been designated as a rest offering. But as a matter of fact, such a cessation from work is actually possible only for agriculturists and never for nomads; for the work which the nomad has to perform can not be set aside at will. The cattle must be fed and watered, gathered together and milked on Sunday or holiday as well as on a workday. To attest this fact I will call no less a witness than Jesus, who says in the Gospel of Luke (xiii. 15): "Thou hypocrite, doth not each one of you on the sabbath loose his ox or his ass from the stall, and lead him away to watering?" in which the impossibility of carrying out the Sabbath command for the stock raiser is directly admitted. It is indirectly admitted in the fact that Mohammed, who otherwise borrowed everything from Judaism, did not adopt the Sabbath, because, opportunist that he was, he said to himself that the institution was not suited to his Arabians. In its Biblical sense the Sabbath command is absolutely impossible as a fundamental law of a nomadic people. At the most Moses may have arranged some sort of a religious celebration for every seventh day. The suggestion which has been lately raised that the Sabbath in ancient Israel did not mean the seventh day and a rest day for every week, but the full moon in opposition to the new moon would overcome this objection, but its foundation is very insecure and its maintenance would develop immense difficulties.



In the same way, facts,—undeniable historical facts,—make it impossible to adhere to the image prohibition as Mosaic and as a fundamental command of the religion of Israel. In Dan, where as in Bethel calf worship was carried on officially, which later the prophets struggled against and denounced, a race of priests officiated, which were descended from a grandson of the founder Moses; hence a direct descendant of Moses became the official priest of the Golden Calf! How could that be possible when every child of Israel (modernly speaking) in the Sunday school must know that Moses pronounced as his second commandment for Israel, "Thou shalt not make unto thee any graven image or any likeness"? Yes, a notorious idol has even been traced back in all naïveté to Moses himself. In the temple at Jerusalem at the time of the prophet Isaiah there was still a brazen serpent to which the Children of Israel offered sacrifices. Therefore it was not merely an historical relic from the years in the wilderness, but a representation of deity, which Moses was said to have wrought, and which King Hezekiah caused to be broken in pieces (2 Kings xviii. 4). These are undeniable facts reported in the Old Testament itself.

Further we must consider that we have no polemic from Elijah and Elisha against the calves of Dan and Bethel. If they showed zeal for the God of Israel against the Tyrian Baal, they also showed zeal for the golden calves as the official form at that time of the worship of God in the kingdom of Israel. Even the prophet Amos who appeared in the midst of Bethel and occupied himself in great detail with the cult there, finds no word of complaint for the Golden Calf there. Hosea who stigmatized that ancient and revered symbol by the disrespectful expression, "calf," was the first to engage in polemics against this and every image and symbolical kind of worship, but simply from reasons of good sense, and without any implication that it

was a great sin which Moses had already forbidden. All of this would be absolutely impossible if the Decalogue of Exodus xx had been known to every Israelite as a fundamental command of the religion of Moses and was generally current as such. But if two of the ten commandments are essentially untenable then the whole becomes untenable.

And to make the question still more involved, we have a second Decalogue in Exodus, an entirely different one which likewise was given to Moses on Sinai and reads as follows: (Exodus xxxiv. 14-26):

"Thou shalt worship no other god. . . .

"Thou shalt make thee no molten gods.

"The feast of unleavened bread shalt thou keep. . . .

"Every firstling is mine. . . .

"Thou shalt observe the feast of weeks. . . .

"Thou shalt observe the feast of ingathering. . . .

"Thou shalt not offer the blood of my sacrifice with leaven;

"The fat of my sacrifice shall not remain until the morning.

"The first of the firstfruits of thy land thou shalt bring...

"Thou shalt not seethe a kid in his mother's milk."

These are the ten commandments on the basis of which, according to the oldest narrators, the so-called Yahvists, the covenant on Sinai was confirmed. In spite of the fact that the two first commandments are essentially identical, it is quite impossible to refer both Decalogues to one original form. This Decalogue of the Yahvist redaction characteristically contains no ethical prescriptions whatever except such as pertain to the religious service; and accordingly it finds the essence of religion in worship. Our own familiar Decalogue bears the relation to this one that Amos bears to his contemporaries.

We must also grant that the tradition that Moses had

made the covenant of Sinai on the basis of ten commandments is very old, but the commandments themselves are missing; for even the Decalogue of Ex. xxxiv can not have been formulated by Moses since it also rests upon the assumption of agriculture and festivals founded upon agricultural customs,—and if we are honest Moses loses nothing by our refusing to ascribe to him this Decalogue. If he had actually established the religion of Israel upon this foundation he would not belong to the greatest religious heroes of mankind.

Accordingly, then, the result of our investigation, which may perhaps seem destructive, is that we have no documents or authentic sayings of Moses, likewise no accounts of him which are even approximately contemporary. Under such circumstances can we dare after all to give a history of Moses and his work? But softly! If we have no historical documents in the usual sense we still have documents from Moses in a higher sense, not written on crumbling stone or moldering parchment, but in living men, as we might say with the Apostle Paul (2 Cor. iii. 3), "Not with ink, but with the Spirit of the living God; not in tables of stone but in fleshy tables of the heart."

Upon the character and history of the people of Israel his work has left such lasting and unmistakable traces, and tradition has retained for us such a great number of highly significant unimpeachable facts that we need be in no doubt. To be sure, documents of this kind, not written with ink, are not always easy to read, and I shall surely not be misunderstood if I often express myself with a certain hesitation; but we shall and can enter upon our task comforted,—yes, I flatter myself, that my readers will feel even especial confidence in a representation of the work of Moses given from a standpoint which they will probably consider very radical, because they have the impression that the author has carefully guarded himself from every incidental

illusion and has avoided every possible source of error in every way practicable.

There is an additional point which lightens our task with regard to Moses; and that is the peculiar double position which he shares with Mohammed only of all the great founders of religions, namely that his is a personality belonging to profane history as well as to the history of religion; he not only founded the Israelitish religion but he also created the Israelitish nation. In his own mind the two sides of his work could not be separated, for in the rôle of prophet he exercised his political activity, as we would call it, in the name of his God as His representative with a definite mission; of this tradition leaves us in no doubt, and in this particular it has certainly drawn his likeness with great accuracy. But we can consider historical facts apart from their religious character and motives, and it is easier to gain a picture of historical than of religious facts. For instance, we can establish the historical facts of the crusades without regard to the religious character and the religious roots of the movement. If we do so we shall obtain only a one-sided picture of them, nor can we have a complete and accurate picture until we have established these historical facts objectively. According to my firm conviction it is also possible to establish the historical facts of the life and work of Moses objectively, and this must be our first task.

In the pages of profane history Moses stands before our eyes as the liberator of his people from Egyptian bondage and as their leader and ruler in peace and war. The Biblical accounts with regard to the fate of the fathers of Israel in pre-Mosaic times permit of the sharpest critique and become the more brilliantly verified according as they are the more exactly investigated and observed. I consider it as proven that Ramses II, the Sesostriis of the Greeks, whose mummy was found a number of years ago,

was the Pharaoh of the oppression, and his son and successor, Merenptah, the Pharaoh of the Exodus. In Moses, the hero and leader of this expedition, tradition sees a Hebrew of the tribe of Levi. And just this fact is unquestionable because it alone offers us the key to one of the most puzzling phenomena in the history of Israel.

It is remarkable that the tribe of Levi appears in two forms which have nothing in common except the name. The earliest tradition describes it as a ruthless and violent secular tribe, who were cursed and condemned to destruction by the patriarch because of a bloody crime, and were actually destroyed. In the later tradition the Levites appear as a purely spiritual race of priests, who from the beginning were set aside for the service of God. The event which resulted in the overthrow of the secular tribe of Levi can have taken place only when Israel came into possession of Palestine, that is to say, in the time after Moses. This event was the treacherous and barbarous capture of the city of Shechem, which brought no blessing to the wicked tribe and its accomplice, Simeon. They succumbed to the revenge of the Canaanites when Israel solemnly separated from them and left them to expiate their burden of sin alone. That tradition should of its own accord have made Moses out to be a member of this cursed tribe is simply unthinkable, whereas if he were really a Levite the riddle is easily solved. Those portions of the tribe of Levi which belonged to the family of Moses and which were very closely connected with him and had placed themselves at his disposal, took of course no part in the criminal undertaking of the rest and so were not entangled in the catastrophe in which it resulted. Thus it happened in fact that only the priestly families remained, and these could hardly have the ambition to reestablish themselves as a secular tribe.

This Hebrew of the tribe of Levi, however, found access,

by a happy chance to the civilization and culture of Egypt, and was educated entirely as an Egyptian. It is certain that his name cannot be accounted for by Semitic derivation, whereas in the form *Mesu* it was a purely Egyptian name, which can be authentically proved to have been generally current at that time. Then too, Pinehas, a traditional name in the family of Moses, which we can not trace back to any Semitic root, is a purely Egyptian *Penehesu*, which likewise may be authentically proved. According to the Biblical narrative, Pharaoh's daughter found the child Moses in the Nile under circumstances familiar to us all, and adopted him as her son. The non-Biblical accounts give her name as Termuthis, or Merris, and in fact we can point out the two names Tmer-en-mut and Meri among the female members of the family of Ramses II.

The Biblical account touches but lightly on the childhood and youth of Moses. It presents him to us at the first as a man and the champion of his people. This deficiency too has been supplied for us by non-Biblical literature. According to Josephus the Egyptian priests demanded his death when he was first brought before Pharaoh, because a prophecy said that this boy would one day bring great evil to Egypt; but his foster mother protected him and bestowed upon him a careful education.

When Moses grew up, Egypt was invaded by the Ethiopians, whom no one had been able to withstand. Then according to the instruction of an oracle Moses was placed at the head of an Egyptian army and performed his task with wonderful intelligence and power, won victory after victory, and finally besieged the Ethiopians in their capital city, Meroë. There the Ethiopian princess, Tharbis, fell in love with him and on his promise to marry her surrendered to him the capital of the enemy, whereupon he returned in triumph to Egypt. We smile over such stories, but the fact remains authentically established that at the

end of the reign of Ramses II and at the beginning of that of Merenptah a certain Mesu was the Egyptian viceroy of Ethiopia, "Prince of Kush," as he was officially styled. Even in the Bible itself we have a very remarkable and puzzling passage where Miriam and Aaron make accusations against Moses on account of an Ethiopian wife he had taken (Num. xii. 1). In any case the peculiar double position of Moses, Hebrew by birth but Egyptian by education, is to be looked upon as historical, and in this respect we are involuntarily reminded of Arminius, the Teutonic Hermann the Cheruscan, who likewise entered into Roman service and arose to the dignity of a Roman knight, but only in order to learn from the Romans how he might free his people from their yoke. The inclination of his heart led Moses likewise to his people; he would rather be the brother of these despised slaves than live in the enjoyment of Egyptian luxury and splendor. If Moses had been born an Egyptian what could have induced him to place himself at the head of the Israelites with whom he could not even make himself understood because of the essential difference between their languages? Perhaps pity for the oppressed, who according to the Egyptian view were no better than the cattle which they herded? Or injured ambition because he did not rise rapidly enough in his career and so would rather be the first among the despised foreigners than to be second among the Egyptians? Neither can Moses have been a member of the Semitic tribes who led a nomad life around Sinai and with whom tradition has brought him in closest connection. The desert is egoistic. To but few does it give a scanty sustenance, so that every tribe would think well before inviting strangers to the table at which they themselves could hardly be satisfied even if they would have won additional strength and influence by such an increase in their numbers. In this point too the tradition



holds its own and every attempt to depart from it causes only entanglement in unsolvable difficulties.

But Moses was above all a founder of religion and therefore it becomes of very particular interest and the highest possible value for us to familiarize ourselves with the religious environment in which he developed. That the careful Egyptian education which fell to his lot was also a religious education, may be taken for granted. And the esoteric religion at least of the Egypt of that day stood upon a very high plane. Its belief was centered in a life beyond. The most important witness of the religious literature of Egypt is the so-called Book of the Dead which treats of the fate of the soul after death. When the soul escapes the fetters of the body it comes before the judgment of the dead where forty-two judges examine its conduct, each with regard to some one particular sin. If these judges declare the soul to be pure it enters into the realm of light, it becomes God once more and returns to God from whom it came. Especially have the mysteries of Osiris this cycle for their object, and we know definitely that in the bosom of the Egyptian priesthood monotheistic speculations were customary, or those with a tendency towards monotheism. To be sure these speculations never led to a practical religious monotheism but at most to a philosophical pantheism. Heliopolis, the Biblical On, had always been one of the main centers of the mysteries of Osiris; and yet it must arouse our attention when an Egyptian tradition, handed down to us from Manethos, says that Moses came from the circle of the Heliopolitan priesthood of Osiris, and when Biblical tradition places Joseph in direct connection with them, since Pharaoh gives him to wife Asenath, the daughter of Poti-phera, priest of On (Gen. xli. 45).

The attempt had even been made in Egypt once before to establish monotheism practically. Not through the



priests, it must be noted, but on the part of the state. Amenhotep IV, the last direct scion of the renowned 18th dynasty, the so-called "heretic king," undertook to establish by the power of government the worship of one God whom he saw incarnate in the solar disk *aten*, hence a solar monotheism, beside which all other cults were to be prohibited. That this remarkable man (who also took a fancy to have himself and his family portrayed in a repulsively ugly fashion), did not attain his purpose, and that the heresy of the heretic king died with him, may be taken for granted. Posterity has condemned him to non-existence, and his name was effaced from all inscriptions, but his attempt remains noteworthy for the history of religion, and there is no doubt but that Moses knew of these things which took place perhaps a hundred years before his time. Thus by no means did he lack religious stimulation in Egypt.

Furthermore his must have been a pronouncedly religious nature, an innate religious genius, and with regard to this we must take into consideration certain influences of his own people. According to Biblical tradition the work of Moses did not fall from heaven but had its point of contact in his own nation and found a prepared ground; neither did the religious history of Israel originate with Moses, but had its beginnings in an earlier time, closely connected with the person of the patriarch Abraham. In this important point too, it is my firm conviction that the Biblical tradition is a perfectly correct; namely, that we must assume the patriarchs of the people of Israel to have had before Moses a pronounced religious character which raised them above related tribes and which was a spiritual power ever against the Egyptians.

The decisive moment in Moses's entire life was during his sojourn among the Midianites in the wilderness of Sinai. There he had become the son-in-law of a Midianite

priest to whom even the Israelitish tradition assigns a certain share in the work of Moses. Even the natives of this Sinai neighborhood we must not imagine as entirely, or even half, wild bushmen. On the contrary, Arabia was the center of an ancient and high civilization, although whether it really reached back to the times of Moses may well be questioned. But at least the Arabian borderlands were under the influence of Egyptian and Babylonian civilization and religious movements, since it is well known that Sinai bears the name of the ancient Babylonian moon-God, Sin. Accordingly the religious soil is here no fallow land. The Biblical tradition itself says distinctly that the new name Yahveh, by which Moses designated the God of their fathers, originated from Sinai and was derived from there, that even before Moses a god Yahveh was worshiped on Sinai.

Here on Sinai took place the event which was for Moses what John's baptism in the Jordan was for Jesus, and the day of Damascus for the Apostle Paul; the Biblical account describes it as the theophany of the burning bush (Exodus iii). We can not explain it nor analyze it but must accept it as a fact—as the phenomena of the religious life do not upon the whole admit of demonstration and mock every rational explanation, but nevertheless are realities. Here God himself laid hold upon him and took possession of him. From this moment he knew himself to be called of God as the saviour of his people and that he must plan his entire future life in the service of this God. He hastened to Egypt in order to call his people to freedom in the name of the God of their fathers who had appeared to him on Sinai. And here too the religious motive glimmers plainly through the oldest account, for they are to travel in the wilderness in order to celebrate there a great festival for their God. And the bold enterprise succeeded. Even in the most supreme extremity and in the greatest dangers

in the face of the despairing and discouraged people Moses clung to the God who had called him, and his faith was not to be shaken. There, as the Biblical account states briefly and strikingly, Israel saw the powerful hand of Yahveh which he had shown to the Egyptians. Then the people feared the Lord and believed the Lord and his servant Moses (Ex. xiv. 31). This triumphant moment made Israel into a nation and Israel never forgot it. Here Israel recognized the God of their fathers who with a strong hand and an outstretched arm had delivered his people and had led them forth out of the house of bondage, out of the land of Egypt. Here too we have a matter of fact to recognize; the deliverance from Egyptian bondage must have been effected by an extraordinary event in which those who experienced it could see nothing but the direct personal intervention of God himself.

At this point, very involved questions begin to arise for the historian which I will at least indicate briefly. It is well known that the mountain where the law was given to Moses is sometimes called Sinai and sometimes Horeb. Are these only two different names or do they indicate two different mountains? And where may this Sinai, or Horeb, be found? Besides it is still maintained on reasons not to be despised, that the oldest narrative makes no mention whatever of this digression by way of Sinai, but had the people of Israel from the beginning wander directly to Kadesh. These are questions which may never be answered with certainty and which need not occupy us here any further. With Kadesh, surnamed Kadesh Barnea in distinction from other places of the same name and to-day the oasis Ain Qudès at the southwest extremity of the Plateau of Azâzime, we have absolutely firm ground beneath our feet. Kadesh is pointed out by tradition so consistently and so positively as the stopping place of Israel after the Exodus and as the scene of Moses's organizing

and administrative activity, that any doubt of this fact would only draw a smile from a methodically trained historian. Now we shall advance to the investigation of his work.

However, there are two methodological considerations to be disposed of first. The man who wishes to influence his times and to direct them into new paths, must stand above them. Therefore even when we have become acquainted with the religious plane of his time we have not yet familiarized ourselves with his personal religious consciousness, for genius is an absolutely incommensurable quantity, and so likewise is religious genius. Furthermore it is a matter of experience that after religious movements have entered into life they usually forfeit their original freshness and purity so that they become secularized and ossified. Supposing that we did not have the four gospels, or that Luther's writings were lost, who would be able to construct the Gospel of Jesus in its entire purity and splendor from the faith and life of the Christian communities of the middle of the 5th century? Or who, by considering the condition of the Lutheran Church at the time of the Protestant scholasticism or the writings of a Calovius and Quenstedt, could imagine that Luther had composed such a precious booklet as his "Freedom of the Christian"? This privilege, however, we must grant also to Moses, and the more since we possess actually no documents by him or about him. Yes, even the fact that we can not positively prove the existence of definite laws or even positively prove their non-existence proves nothing against Moses. As Jesus said to his disciples (John xvi. 12): "I have yet many things to say unto you, but ye can not bear them now," so Moses too may have thought, and I am firmly convinced that such is the fact. I might make the statement that Moses shows himself to be a genius in pedagogy since he would not take the second step before the first, and

promoted his work most emphatically by that which he did *not* give his people. He gave them no superfluous ballast but only what they could grasp and what they needed; not philosophical speculations, nor dogmatic instruction, but life, the most vital life, religious life, moral life.

I will select two important points for the explanation of what I mean by the two methodological considerations. It may have offended many of my readers when I was obliged to declare that Moses could not have enacted a law prohibiting images and have made it a foundation stone of his religion; but does this prove, or do I mean by it to say, that Moses was a worshiper of images and thought it right and praiseworthy to worship God in images? The only object relating to worship which we can refer back to him with certainty is the holy Ark, a pure symbol which never misled the people to any idolatrous misuse; and at the same time the tribes and races in the midst of which Israel lived at the time of Moses were not idol worshipers in this sense, but they too had only religious symbols; so that Moses had no practical occasion for such a command, whereas he himself acted according to this knowledge, and his work lay entirely in this direction.

Now for the chief central question with regard to monotheism. That Israel did not possess a pure, clearly conceived monotheism for centuries after Moses, that in the eyes of Israel Yahveh was not the one God in heaven and upon earth, but that they saw realities also in the other gods, is absolutely certain. But what does this prove in regard to Moses? Can not Moses personally have held to a pure monotheism? Who will decide *a priori* the point beyond which genius may not pass, and must Moses have confessed a religious perception inferior to that of the author of the ancient narrative of paradise and the fall of man, whose monotheism indeed leaves nothing to be de-

sired? Could not Moses be content with what he actually accomplished, to bid Israel to worship its own God only and to forbid it to serve any other God besides? If Israel was actually convinced that it had only its one God to serve, who laid claim upon it as his possession alone, and wished to be everything to it, that would be practically much more valuable than any theoretical doctrine about the nature of God, and Moses could confidently leave the rest to God and time.

So much is made nowadays of monotheistic currents in the religions of ancient civilizations. But however great we may assume the influence of the Egyptian esoteric doctrine upon Moses to have been, even if a pure monotheism was taught in these mysteries, still to Moses belongs the enormous merit that what was whispered about among the initiated in Egypt was now preached from the house tops and made useful to humanity, and especially that he had drawn the religious consequences therefrom. These same Egyptian priests who in their esoteric teachings gave themselves up to the most profound speculations, prayed in public with the most earnest air of solemnity to cats and ibises, crocodiles and the "holy ox" as Theodore Mommсен translates the "Apis," and rendered to them divine honors; but a purely theoretical monotheism which exists in a brotherly fashion side by side with the grossest practical idolatry, is religiously not worth a farthing. In this respect Moses accomplished a sweeping reform and performed a complete task: such a double entry method of book-keeping was impossible in the religion of Moses. In all religions there have been monotheistic tendencies, currents and attempts, but only in the religion of Israel had monotheism become a power, and indeed a power determining the entire religion; and this is the work and merit of Moses. Nor did he hesitate to shed blood, as is shown by that remarkable story attested by the oldest tradition,

in which he enlisted the tribe of Levi to aid in putting down a religious rebellion (Exodus xxxii. 26 ff., compare Deuteronomy xxxiii. 8 f.) When Saul caused all the wizards and those who had familiar spirits to be hunted out and executed (1 Samuel xxviii. 3 and 9), he proceeded entirely in the spirit of the zealous God of Moses who permitted none other to rule beside himself. And this enormous energy which supplanted all rivals making it impossible for them to exist side by side with himself, the God of Moses manifested also in the spiritual realm. Israel is the only nation of which we have knowledge, that has never had a mythology, that never differentiated divinity according to sex—the concept “goddess” is so absolutely inconceivable to the Israelites that the Hebrew language never attempted to form the word “goddess.” This is a miracle performed by Moses which is greater and more incomprehensible than the greatest and most incomprehensible which tradition has ascribed to him. A man who has exercised such an enormous influence on the entire thought and sensibility of his people and has modelled it so completely according to his own personal higher knowledge, such a one truly belongs to the greatest spiritual heroes of humanity.

We have repeatedly called attention to the fact that Moses aimed first of all to awaken religious life. Especially significant for this and of definitive importance for all later time is the form of his religious foundation. Yahveh alone Israel's God, and Israel Yahveh's people,—this is perhaps the shortest formula to which we can reduce the fundamental idea of Moses. But how came this relation to exist? All tradition unites in agreeing that in its form the peculiar establishment of the religion of Israel consisted of a covenant between Yahveh and Israel, made through the intervention of Moses. By this means alone was this relation lifted out of the realm of nature into that of the moral



decision of the will. This covenant was grounded upon experience of the power of Yahveh. He had made real that which appeared impossible, had freed Israel from the bondage of Egypt, had therefore shown himself more mightily than even powerful Egypt with all its many gods, and had also given further proof of his power to help. So the God to whom Israel in this covenant had vowed herself by a free act of will, was not an abstraction, not an unyielding destiny but the personal living God of history, the relation to him was a personal ethical relation which as it was entered upon voluntarily could also be broken voluntarily. Whether Moses himself had already drawn this conclusion, and had it in mind, we know not. Later it gave the prophets a basis for their ethical preaching and their deepening of the religious relation.

That this relation of Israel to Yahveh was not purely theoretical but also manifested itself in a practical manner may be taken for granted. Its official manifestation, so to speak, was to be found in the religious worship. That Moses had regulated the religious service and standards for the worship of Yahveh is a matter of course. To be sure we can not reconstruct exactly this Mosaic order of service in particulars, but we must assume that Moses inspired a new spirit into the worship which made it possible for it to keep the most important heathen abominations at a distance. Among the nations in the vicinity of Israel the customs of infant sacrifice and religious unchastity prevailed. These were proscribed by the religion of Israel and wherever they crept in were recognized at once as poison drops foreign to its blood.

Furthermore, the relation of Israel to Yahveh manifested itself in a moral life, according to the requirements of this God. Here we have the peculiar center of the activity of Moses whom tradition describes before all as the judge and organizer of his people. And right here has



the consequence of his activity been visible and significant. In fact Israel stood far higher morally than the neighboring peoples. It must have had a particularly pronounced sense of right and wrong, and the sphere of morals in a most special sense was peculiarly Israel's honor and renown. From the beginning Israel had abhorred unchastity in a manner that we do not find to be the case with other Semites. All of this is due to Moses, who silently and unobtrusively organized his people in Kadesh, moralizing, guiding, and sowing noble seeds, and who educated them religiously in the sense and spirit of the Decalogue, even if he did not himself formulate it, and so made it possible for them to become the nation of religion and in the course of centuries to bring forth the greatest of all.

It is most probable that Moses also died in Kadesh. According to all indications Israel's stop there must have been a pretty long one, and it is an essential feature of the Israelitish tradition that neither Moses nor any of those who came out of Egypt was permitted to tread the promised land; and this is of greater significance when we consider that we are dealing with a distance which under normal conditions could have been easily passed in a fortnight. Of special importance for this question, however, is the explicit statement that nobody knows where Moses's grave is "unto this day" (Deut. xxxiv. 6). When we consider what an important part the grave, and especially the grave of a hero, played in the conception of ancient Israel, we must declare it to be absolutely unthinkable that the grave of Moses should have remained unknown if he had died and had found his last resting place in a spot which Israel considered as belonging to its domain. But we must look upon this circumstance too as providential, for if the grave of Moses had been known, there is no doubt but a personal cult would have been connected with it which might have

had evil consequences for the religion he had founded. This was not to be. He was to live on only in his work.

There is a beautiful Jewish legend about the death of Moses. It is possible to translate the fifth verse in the last chapter of Deuteronomy relating to his death, "So Moses, the servant of the Lord, died there *at the mouth* of Yahveh." Therefore the Jewish legend tells how in the last hour of Moses's life God fulfilled his ardent wish to behold His face, which in life He was obliged to refuse him (Ex. xxxiii. 18-23) and so Moses died at the mouth of God who by a kiss took to Himself the soul of his faithful and trusted servant. A deep meaning lies in this story, for verily did Moses receive the consecration kiss of deity. Whoso recognizes in Jesus Christ the end and turning point in the history of humanity must also confess that before him no greater mortal trod this earth, and that to no second mortal does humanity owe more than to Moses, the man of God. The foundation of what in Jesus Christ has found its conclusion and its perfection, was laid by Moses, since he was the first to give to the world clearly and consciously as the foundation and basic principle of all religious life, the faith in the one, living, personal, holy God.

C. H. CORNILL.

BRESLAU. GERMANY.

## THE DRAMATIC ELEMENT IN THE UPANISHADS.

A GOOD many readers make the acquaintance of the Upanishads in the two volumes which Prof. Max Müller contributed to the now world-famous *Sacred Books of the East*, the first being the opening volume of that long and wonderful series. It is, therefore, to some degree a matter of regret that Prof. Max Müller decided to begin his work of translation just where he did, namely, with the Chhandogya Upanishad; for it happens that the opening passages of that wonderful and complex tract are occupied with a very interesting, but at the same time very confusing and prolix disquisition, which must be practically meaningless to many readers, and which must give a rather misleading and discouraging view of the whole content of the Upanishads.

One may, perhaps, suppose that the Upanishads could be compared to some of those minerals which one sees in our museums, where bright and beautifully formed crystals are embedded in dull, unattractive matrix of quite different nature, and that this opening passage of the Chhandogya is a part of the matrix. Perhaps it may be possible to cut away the matrix, and rearrange the crystals, now revealed as precious gems, in some more attractive order. And a part of the matrix which may, perhaps, have to be set aside, is the Brahmanical view that the Upanishads, in their central and essential material, have a close connection with the Four Vedas, or with the Vedic

schools whose names are now embedded in the titles of some of the Upanishads. But this part of the question requires fuller study.

The central and essential element of the Upanishads is to be found, I think, in a group of little dramas, or dramatic fragments, which one is tempted to call Dramas of the Mysteries, both because many of them expressly and explicitly set forth a secret or esoteric teaching, and because, as short dramas intended to reveal spiritual truth, they bear some resemblance to the Mystery Plays of our own Middle Ages. In fact, the dramatizing instinct is as conspicuous in most of the Upanishads as it is, let us say, in the parable of the good Samaritan, or the Pharisee and the Publican. And we shall get a clear view of a fascinating, profound and very attractive body of literature, if we take the dramatic fragments of the Upanishads and study them apart from their setting, which seems in so many cases like the matrix surrounding precious stones, and in some cases mere rubbish, the accretion of ages of uncritical and rather superstitious study.

Fundamental for a right understanding of the dramatic pieces in the Upanishads, is, I think, a very remarkable drama which occurs, with almost verbal identity, in the two longest Upanishads, the Brihad Aranyaka Upanishad, and the Chhandogya Upanishad. I shall try to translate the version in the Brihad Aranyaka, and then comment on certain very illuminating variations in the Chhandogya version. As the Upanishads are now arranged, this story is found in the Sixth Adhyaya of the Brihad Aranyaka Upanishad, beginning with the second Brahmana. The story runs as follows:

Shvetaketu, verily, Aruna's grandson, came to the assembly of the Panchala nation. He came to Pravahana, son of Jivala, who was attended by his followers. Looking up at him, the king addressed him:

"Youth!" said he.

"Sir!" he replied.

"Hast thou received the teaching from thy father?"

"Yes!" he said.

"Knowest thou how these beings going forth from this world, proceed on different paths?"

"No!" said he.

"Knowest thou how they come to this world again?"

"No!" he said.

"Knowest thou how that world is not filled up by the many going thither again and again?"

"No!" said he.

"Knowest thou at which sacrifice being sacrificed, the waters, rising up, speak with human voice?"

"No!" said he.

"Knowest thou the approach of the path of the gods, or of the path of the fathers, or by doing what they approach the path of the gods or the path of the fathers: as the word of the Rishi has been heard by us:

"Two ways I heard of, for mortals, the way of the fathers and the way of the gods.

By them goes all that moves, between father heaven and mother earth."

"No!" said he; "I do not know even one of them."

The king invited him to remain as his pupil. Not consenting to remain, he ran away to his father. He said to him:

"Forsooth, Sir, thou didst say that we had received the teaching!"

"How now, wise one?" he answered.

"This Rajanya fellow has asked me five questions, and I do not know one of them!"

"What were they?" said he.

"These!" said he, and he enumerated them.

His father said:

"Thou knowest us thus, dear, that whatever I know, I told it all to thee! But come, let us two set forth thither, and dwell as pupils with the king!"

"Go yourself, Sir!" said he.

That descendant of Gotama went to where Pravahana, son of Jivala was. To him offering a seat, the king caused water to be offered. He made him the offering. To him the king said:

"We give a wish to the worshipful descendant of the Gotamas."  
He said:

"This wish is promised to me: the speech that thou didst speak in the presence of the boy, tell me that!"

The king said:

"That, O descendant of the Gotamas, is among the wishes of the gods. Say a wish of men!"

He said:

"It is well known! There is store of gold, of cattle and horses, of slave-girls and tapestries and robes! May the Master not be niggardly toward us, in that which is great, infinite, illimitable!"

The king said: "This wish, descendant of the Gotamas, must be sought according to rule."

"I offer myself as thy pupil!" said he. For with this word the men of old betook them to a master. He therefore dwelt there, thus becoming his disciple.

The king said to him:

"Therefore, O descendant of the Gotamas, be thou without reproach toward us, thou and thy forefathers: since this teaching never before dwelt in any Brahman, but to thee I shall declare it, for who has the right to refuse thee, speaking thus!"

So far, the prologue of the story. Before translating the teaching of the king it may be well to make some comments on what we have already recorded.

To begin with, it is evident that the Brahman boy Shvetaketu did not well consider and ponder over the questions that were put to him, for, with the exception of the last, the group of questions imply their own answers. Thus the first question, as to the diverging paths on which beings proceed on going forth from this world at death, is really answered by the fourth question. For the diverging paths are the path of the gods and the path of the fathers, by which goes all that moves between father heaven and mother earth. In like manner the answer to the question why the other world is not filled to overflowing by the souls that go thither incessantly, is because

they come to this world again. Therefore we are here concerned with the teaching of rebirth, or reincarnation.

As has already been said, there is another version of this same story in the Upanishad which is next in length to the Brihad Aranyaka, namely, in the Chhandogya Upanishad. It is in the third and following khandas of the fifth Adhyaya. There are certain verbal variations, as for example *samiti* instead of *parishad*, for the "assembly" of the Panchala nation. The order of the questions is not exactly the same, and in the last question, instead of asking "at which sacrifice the waters arise, and speak with human voice?" he asks: "Knowest thou how, at the fifth sacrifice the waters arise," and so on. But the most important difference is in the words of the Rajanya to the old Brahman, when he at last consents to tell him the answers to the questions:

"As this teaching, O descendant of the Gotamas, goes not to any Brahman before thee, but among all peoples leadership was of the Kshatra," that is, of the Kshatriyas, the men of the Rajanya race.

For there is much evidence to show that the difference between the Brahman and the Rajanya was not merely a difference in "caste," that is, in social position and function, but was in fact a difference in race, or in "color," as the Sanskrit word *varna*, translated "caste," really means. The evidence on this point has been set forth elsewhere at considerable length, supported by the testimony of the best authorities. It must suffice here to say that it falls naturally into two parts: first, the proof that the Rajputs of to-day are ethnically distinct from the Brahmans of pure stock, the Rajputs being a red, ruddy or copper-colored race,<sup>1</sup> while the Brahmans are white-skinned, and

<sup>1</sup> A number of distinguished men, who had a special knowledge of Rajputana, have put themselves on record concerning the skin-color of the Rajputs (see *Royal Asiatic Quarterly*, 1893, p. 390). Sir George Birdwood wrote, with special reference to a passage in the Mahabharata: "*lohita*, red, ruddy, is a proper epithet to apply to a pure Rajput." Sir William Moore said that

the two races being further distinguished by skull-form, stature, and the other qualities which make for race-difference. The descent of the pure-blooded Rajput of to-day from the Rajanya of two thousand years ago is unquestioned, as is the race-continuity of the pure-blooded Brahman. This brings us to the second part of our evidence: the fact that the race-difference between Rajanya and Brahman was recognized in India more than two thousand years ago; and that precisely the difference in color which we have described, was hit on as a distinguishing character. There are, of course, besides the red Rajput and the white Brahman, two other ancient race-stocks in India distinguished by color: namely, the yellow races, generally called Kolarian, such as the Santals of Bengal and the Savaras of Madras; and the black Dravidian races of the south, whose languages are Tamil, Telugu, Malayalam and the rest of the Dravidian family. The yellow races seem to have inherited from a remote time the culture of rice and silk, which are so characteristic of the yellow race in China;<sup>2</sup> and the black races, the Dravidians, have re-

"red, ruddy, rust-colored would describe the appearance of the best class of Rajputs, but there are many who would come under the heading brown." Sir Richard Meade added important details: "I have had much intercourse with Rajputs of all classes, and should say that the color of the true Rajput is fairer than that of the people of the northwestern provinces, i. e., that the skin is clearer under the color, if I may so describe it, while the color itself is somewhat less pronounced. Of course, as a rule, Chiefs and Thakurs are fairer than the lower orders of Rajputs, who are themselves more exposed, and who are the descendants of those who for many generations have been so." In answer to an inquiry as to the skin-color of the Rajputs under the sunburn, Sir Richard Meade wrote: "The sub-shade of color in many of the Rajputs I have seen was of a light ruddy character, in others it was rather sallow, and in others again of a dusky reddish tinge." Sir Richard Temple endorsed these conclusions, saying: "I should concur in the view that the color of the true Rajputs is a reddish brown, and that it is possible or likely that the brownish element is only the result of sun-action." Dr. Fitzedward Hall added the point that the skin-color of the true Rajputs is extremely like that of the Red Indians of America.

<sup>2</sup> Cf. R. F. Johnston, F.R.G.S., M.R.A.S., *From Peking to Mandalay*, p. 438, Note 41: "It seems quite clear that the Licchavis—or the great Vaggian or Vrijian clan-system to which they belonged and from which the Mauryans sprang—were neither Aryans nor Dravidians. In all probability they were of Kolarian or Munda race. The Kolarians seem to have entered India from the northeast—just as the Aryans afterwards entered it from the northwest—and extended themselves over vast areas from which they were subsequently



markable skill in handicrafts, in building, in metal work, and so on, the temples of Madura and other southern cities being among the wonders of the world.

Keeping this position of the four races or "colors" in mind, we are in a position to see the absolute accuracy of the following passage from the Mahabharata, in the Shantiparvan, beginning at verse 6934:

"The color (*varna*) of the Brahman was white, that of the Kshatriyas red, that of the Vaishyas yellow, that of the Shudras black. . . . This world, having been at first created by Brahma entirely Brahmanic, became separated into color in consequence of works. Those twice-born men who were fond of sensual pleasure, fiery, irascible, prone to violence, who had forsaken their duty, and were red-limbed, came into the condition of Kshatriyas.

"Those twice-born who derived their livelihood from kine, who were yellow, who subsisted by agriculture, and who neglected to practise their duties, entered into the state of Vaishyas. Those twice-born who were addicted to mischief and falsehood, who were covetous, who lived by all kinds of work, who were black and had fallen from purity, sank into the condition of Shudras."

The two words used to describe the skin-color of the military race, the Kshatriyas, in this passage, *lohita* ("red") and *rakta-anga* ("red-limbed"), are admitted by the highest authorities to be accurately descriptive of the skin-color of the military race of Rajputs at the present day. It would seem, therefore, that we have a conclusive demonstration of the true relation of the "castes"; they are really, what the Sanskrit word means, "colors," the colors of four distinct races, white, red, yellow and black as we find them in India to-day, and as they must have been when the balance of power between the four races, which is called

driven by Dravidians and Aryans. They must have originally come from the countries that lay to the east, which we now know as Burma, China and Indo-China."

the Chaturvarnya, or "Four-color system," was first struck in that admirably durable polity which finds its most famous expression in Manu's Laws. The two fundamental principles of this polity were first, that each race must remain distinct, of pure blood, intermarriage being heavily penalized; and, secondly, that each race should perform, in the state, those functions for which it was fitted by physical character and moral development. Both principles are thoroughly sound and wise; and to their wisdom was due the long duration of the "four-color system," in India.<sup>3</sup>

If, therefore, as seems certain, the difference between the Brahmans and the Rajanyas or Kshatriyas is really a difference of race; if they were in the beginning two independent race-stocks, then the words in our Upanishad story take a new and striking significance: "This teaching never before dwelt in any Brahman, but was among all peoples the instruction of the Kshatriya alone." On this sentence, Shankaracharya, the greatest of the Brahmans, comments: "This teaching was handed down for a long time, by the succession of teacher and pupil, among the men of the warrior race." The word translated "succession of pupil and teacher," Kshatriya-*parampara*, as used by Shankara, has a technical meaning very close to "apostolic succession." One may illustrate it by saying that the "Shankara-guru-parampara" chain, the chain of the successors of Shankara himself, is still unbroken at the Shringeri math in Mysore. The word implies the handing down of a mystery teaching through initiation.

<sup>3</sup> Cf. T. W. Rhys Davids, *Buddhist India*, Preface, p. iii: "In the following work a first attempt has been made to describe ancient India from the point of view, not so much of the Brahman, as of the Rajput." And again, p. 53: "The basis of the social distinctions was relationship; or, as the Aryans, proud of their lighter color, put it, color. Their books constantly repeat a phrase as being common amongst the people, which divided the world, as they knew it, into four social grades, called colors (Pali, *vanna*). At the head were the Kshatriyas, the nobles. They were most particular as to the purity of their descent through seven generations, both on the father's and the mother's side; and are described as 'fair in color, fine in presence, stately to behold' (*Dialogues of the Buddha*, i, 148; Vin. II, 4, 160)."

On the Brihad Aranyaka Upanishad version of the story, Shankara makes a practically identical comment, using the same technical phrase, with the same implication of a mystery teaching, handed down among the Rajanyas by initiation.

One version of the story we have translated comes, as we saw, from the Brihad Aranyaka Upanishad. This Upanishad is attributed to, or associated with, the school of the Vajasaneyins, the chief school of the White, or clarified Yajur Veda. The other version of the story comes from the Chhandogya Upanishad, which is in like manner associated with the Sama Veda. The accepted theory is that the schools which made these divisions of the Vedas their special study, developed the corresponding Brahmanas and Upanishads by speculation on the sacrificial parts of the Vedic hymns. But so far as the two versions of the story of Shvetaketu are concerned, this is apparently mere myth-making. There is not the slightest necessary connection between the story and either Veda; nor do the slight differences between them, which we have noted, bear any relation at all to the difference between the Sama and Yajur Vedas.

The account inherent in the story itself is at variance with this supposed relation to the Vedic hymns. These hymns are, broadly speaking, and hymns like those attributed to Vishvamitra excepted, the creation of the white Brahmans, and they became the hereditary property, and liturgical capital, of these same Brahmans, a position which was maintained through milleniums of Indian history. But if we are to believe King Pravahana, and to understand his words in their plain sense as Shankara understands them, then the teaching imparted by the king was not the creation of the Brahmans at all, it was the hereditary secret teaching of the Kshatriyas, the red Rajanyas, handed down as a mystery teaching from teacher

to pupil, from master to disciple, and never before came to any Brahman, until that memorable occasion when king Pravahana himself imparted it to the Brahman Uddalaka the son of Aruna.<sup>4</sup>

Now let us return to the text of the Brihad Aranyaka Upanishad and see exactly what was this secret teaching of the red Rajanyas, then for the first time imparted to a white Brahman.

King Pravahana, son of Jivala, discloses the Rajanya view of human life by describing the condition of the soul before it leaves heaven to enter the form of an unborn infant. He uses a symbolism taken from the sacrificial

<sup>4</sup> Cf. Paul Deussen, *The Philosophy of the Upanishads*, p. 17 ff.: "The Upanishads have come down to us, like the rest of the texts of the three older Vedas, through the Brāhmins. All the more striking is it, therefore, that the texts themselves frequently trace back some of their most important doctrines to kings, i. e., Kshatriyas. Thus, in the narrative of Chānd. 5, 11-24, five learned Brāhmins request from Uddālaka Aruni instruction concerning the Atman Vais'vānara. Uddālaka distrusts his ability to explain everything to them, and all the six therefore betake themselves to the King As'vapati Kaikeya, and receive from him the true instruction, the defectiveness of their own knowledge having first been made clear. In Brih., 2, 1 (and the parallel passage, Kaush. 4) the far-famed Vedic scholar Gārgya Bālāki volunteers to expound the Brahman to King Ajātas'atru of Kāśī, and propounds accordingly twelve (in Kaush. 16) erroneous explanations; whereupon to him, the Brāhman, the king exhibits the Brahman as the ātman under the figure of a deep sleeper, prefacing his exposition with the remark, 'that it is a reversal of the rule, for a Brāhman to betake himself as a pupil to a Kshatriya in order to have the Brahman expounded to him; now I proceed to instruct you.' In this narrative, preserved by two different Vedic schools, it is expressly declared that the knowledge of the Brahman as ātman, the central doctrine of the entire Vedānta, is possessed by the king; but, on the contrary, is not possessed by the Brāhman 'famed as a Vedic scholar.' In Chānd. 1, 8-9, two Brāhmins are instructed by the King Pravāhana Jaivali concerning the ākās'a as the ultimate substratum of all things, of which they are ignorant. And although it is said in Chānd. 1, 9, 3, that this instruction had been previously imparted by Atidhanvan to Udaras'āndilya, yet the names allow of the conjecture that in this case also a Brāhman received instruction from a Kshatriya. Similarly Chānd. 7 contains the teaching given by Sanatkumara, the god of war, to the Brāhman Nārada. Here the former pronounces inadequate the comprehensive Vedic learning of the Brahman with the words: 'All that you have studied is merely name.' Finally the leading text of the doctrine of the soul's transmigration, which is extant in three different recensions, is propounded in the form of an instruction given to Aruni by the King Pravāhana Jaivali.... The fact, moreover, which is especially prominent in the last quoted passages, that the Brāhmins during a long period had not attained to the possession of this knowledge, for which they nevertheless display great eagerness, is most simply explained on the supposition that this teaching with regard to the Atman was studiously withheld from them; that it was transmitted in a narrow circle among the Kshatriyas to the exclusion of the Brahmins; that, in a word, it was *upanishad*."

altar, and speaks of "the fire, the fuel, the flame, the smoke, the embers and the sparks." We may lay aside this really eloquent symbolism, and summarize this part of the teaching.

The soul, King Pravahana teaches, dwells in the celestial world. In it adhere certain streams of tendency, which he calls "the waters," the currents of moral and mental life. The soul descends from the celestial world to the mid-world, through sacrifice, and in the midworld takes on a "lunar" form, the things of the midworld being always compared to the moon, which waxes and wanes, and shines by reflected light; the celestial or spiritual world in contrast being always compared to, or symbolized by, the sun.

The soul continues its downward course and enters the sphere of this world. This is again called a sacrifice. The soul then comes into relation with its future father and mother, these relations being again symbolized as sacrifices. Finally there comes the fifth sacrifice, the sacrifice of physical birth, after which "the waters," that is, the currents of character forming the new-born child, "arise, and speak with human voice"; thus giving us the answer to the last of the five questions proposed to young Shvetaketu by the Rajanya king.

At this point, we may once more try to translate the Upanishad text:

"From this sacrifice, the man comes to birth. He lives his full life-span, and then he dies, and they take him to the pyre... In this fire the bright powers offer the man, and from that sacrifice the man is born, of the color of the sun.

"They who know this thus, and they who, in the forest, follow faith and truth, they are born into the flame, from the flame they go to the day, from the day to the waxing moon, from the waxing moon to the six months in which the sun goes north, from these months to the Deva-world, from the Deva-world to the sun, from the sun to the lightning; them, reaching the lightning, a person, mind-born, coming, leads to the worlds of the Eternal. They dwell in

those worlds of the Eternal, in the highest realms; for them there is no return.

"But they who win worlds by sacrifice, gifts, penance, they are born into the smoke of the pyre, from the smoke they go to the night, from the night to the waning moon; from the waning moon to the six months in which the sun goes south, from these months to the world of the fathers, from the world of the fathers to the moon. They, reaching the moon, become food. The gods feast on them, as they wax and wane, like the lunar lord. Then, going full circle, they descend to this ether, from the ether to the air, from the air to rain, from rain to the earth; reaching the earth, they become food. Again they are sacrificed in the fire of man and the fire of woman, and are reborn, coming forth again to the world of men. Thus, verily, they go on their circling way."

We are warned, of course, by the symbolical form in which the Rajanya states his questions, that the answers also are symbolical. We may suggest the interpretation of this symbolism by saying that the Rajanya teacher seems to describe a series of worlds, or planes of consciousness, in ascending degrees, from the higher of which the soul descends into incarnation. Further, he suggests that each world or plane has, as it were, a positive and a negative pole, a pole of spirituality and a pole of materiality. These poles of the ascending planes he suggests by a series of natural antitheses: the fire and the smoke of the pyre, for the positive and negative pole of the lowest plane; day and night, for the positive and negative pole of the next plane in ascending order; the moonlit and moonless fortnights for the poles of the next higher plane; summer and winter, for the poles of the next; the sun and moon for the next; the world of the gods and world of the fathers, for the poles of the next. This is really admirable and very consistent symbolism, and the use of the sun and moon for the spiritual and psychic worlds respectively, runs through all the Upanishads.

The suggestion is that the course of the soul at death, through these ascending planes, is determined by the quality of its spiritual life; the soul inspired by faith and truth gravitates to the spiritual pole of each plane, and ascending, comes to a realm where "a person, or spirit, mind-born, leads it into the world of the Eternal, whence it no more returns."

The soul, on the contrary, which seeks to win worlds through sacrifices, penances and gifts, worshiping selfishly, gravitates after death to the more material pole of each plane. It finds its way to the "lunar world," and there becomes "food for the gods." It wanes, and descends once more to this world, returning through the gates of birth to terrestrial life.

We have, therefore, on the one hand, the path of faith and truth, the path of the sun, the path of the gods, leading to the world of the Eternal from which there is no return, in a word, the path of complete Liberation, *moksha*, Nirvana; and, on the other, we have the path of selfish worship, the path of the moon, the path of the fathers, the path of Reincarnation, of Sansara, of the Circle of Necessity. We have, in fact, the fundamental antithesis, the twin-doctrine of Liberation and Reincarnation, which is the heart of the Indian wisdom. And we are told that "this teaching never before dwelt in any Brahman, but was, among all peoples, the hereditary teaching of the Rajanya alone." Finally, we have the strongest reason to believe that the red Rajanya represented not a different class, but a different race, from the white Brahman; a race which may well have been firmly established in India, when the white race, from which the Brahmans came, first descended from the Hindu Kush.

In another chapter of the Chhandogya Upanishad, namely, in the beginning of the Sixth Adhyaya, we have another story of Shvetaketu and his father, Uddalaka



Aruni, which is equally graphic and dramatic. It begins as follows:

There lived once Shvetaketu, Aruna's grandson; his father addressed him, saying:

"Shvetaketu, go, learn the service of the Eternal; for no one, dear, of our family is an unlearned nominal worshiper."

So going when he was twelve years old, he returned when he was twenty-four; he had learned all the teachings, but was conceited, vain of his learning, and proud.

His father addressed him:

"Shvetaketu, you are conceited, vain of your learning, and proud, dear; but have you asked for that teaching through which the unheard is heard, the unthought is thought, the unknown is known?"

"What sort of teaching is that, Master?" said he.

"Just as, dear, by a single piece of clay anything made of clay may be known, for the difference is only one of words and names, and the real thing is that it is of clay; or just as, dear, by one jewel of gold, anything made of gold may be known, for the difference is only one of words and names, and the real thing is that it is gold; or just as, dear, by a single knife-blade, anything made of iron may be known, for the difference is only one of words and names, and the real thing is that it is iron; just like this is the teaching that makes the unknown known."

"But I am sure that those teachers did not know this themselves; for if they had known it, how would they not have taught it to me?" said he; "but now let my Master tell it to me."

"Let it be so, dear!" said he.

"In the beginning, dear, there was Being, alone and secondless. But there are some who say that there was non-Being, in the beginning, alone and secondless; so that Being would be born from non-Being; but how could this be so, dear?" said he; "how could Being be born from non-Being? So there was Being, dear, in the beginning, alone and secondless."

"Then Being beholding said: Let me become great; let me give birth. Then it put forth Radiance."

"Then Radiance beholding said: Let me become great; let me give birth."

"Then it put forth the Waters. Just as a man grieves or sweats, so from radiance the waters are born."



"Then the Waters beholding said: Let us become great; let us give birth.

"They put forth Food. Just as when it rains much food is produced, so from the waters Food is born.

"Of all these, of beings, there are three germs: what is born of the Egg, what is born of Life, what is born of Fission.....

"Man, dear, is made of sixteen parts. Eat nothing for fifteen days, but drink as much as you wish; for Breath, being formed of the Waters, is cut off if you do not drink."

He ate nothing for fifteen days, and then returned to the Master, saying:

"What shall I repeat, Master?"

"Repeat the Rig, the Yajur, the Sama verses, dear!" said he.

"None of them comes back into my mind, Master!" said he.

He said to him: "As, dear, after a big fire, if a single spark remain, as big as a fire-fly, it will not burn much; just so, dear, of your sixteen parts one remains, and by this one part you cannot remember the Vedas.

"Go, eat; and then you will understand me."

He ate, and then returned to the Master; and whatever the Master asked, all came back to his mind.

The Master said to him: "As, dear, after a big fire, if even a single spark remain, as big as a fire-fly, and if it be fed with straw, it will blaze up and will then burn much; just so, dear, of your sixteen parts one part was left; and this, being fed with food, blazed up, and through it you remembered the teachings.

"For mind is formed of Food; Breath is formed of the Waters; Voice is formed of Radiance."

Thus he learned; thus, verily, he learned.

Nothing could be more vivid and dramatic than the characterization of Shvetaketu, "conceited, vain of his learning, and proud." We at once recognize the pert youth who, after his father had instructed him, went to the assembly of the Panchalas, to be so wofully worsted by the Rajanya Pravahana, son of Jivala. It is to be noted that, even before his father took the vain youth in hand, he had learned the Three Vedas, and could repeat the verses of the Rig, the Yajur and the Sama Vedas. How was it then, that, being so fully instructed, he was so com-

pletely at a loss, when the Rajanya master asked him concerning the twin doctrines of Liberation and Reincarnation?

The answer is as simple as it is vital to a proper understanding of the wisdom of ancient India. He was at a loss concerning the twin doctrine of Liberation and Reincarnation precisely because these doctrines are nowhere to be found in the Three Vedas, which are concerned with quite other themes and purposes. At this point, we should do well to read the Tevijja Sutta, the Sutta, that is, of the Three Vedas; wherein another great Rajanya, of the royal race of Ikshvaku, cross-examines yet other Brahman<sup>s</sup>, well versed in the Three Vedas, concerning the Way of Wisdom.

In the further teaching imparted by Uddalaka Aruni to his son, there are certain passages well worth quoting here, both for their beauty, and because they form a characteristic part of the dramatic element in the Upanishads. The father has taught many things to the son.

"Let the Master teach me more!" said he.

"Let it be so, dear!" said he.

"As the honey-makers, dear, gather the honey from many a tree, and weld the nectars together in a single nectar; and as they find no separateness there, nor say: Of that tree I am the nectar, of that tree I am the nectar. Thus, indeed, dear, all these beings, when they reach the Real, know not, nor say: We have reached the Real. But whatever they are here, whether tiger or lion or wolf or boar or worm or moth or gnat or fly, that they become again. And this soul is the Self of all that is, this is the Real, this is the Self. That thou art, O Shvetaketu!"

"Let the Master teach me more!" said he.

"Let it be so, dear!" said he.

"These eastern rivers, dear, roll eastward; and the western, westward. From the ocean to the ocean they go, and in the ocean they are united. And there they know no separateness, nor say: This am I, this am I. Thus indeed, dear, all these beings, coming forth from the Real, know not, nor say: We have come forth from

the Real. And whatever they are here, whether tiger or lion or wolf or boar or worm or moth or gnat or fly or whatever they are, that they become again. And that soul is the Self of all that is, this is the Real, this is the Self. That thou art, O Shvetaketu!"

"Let the Master teach me more!" said he.

"Let it be so, dear!" said he.

"If anyone strike the root of this great tree, it will flow and live; if any one strike the middle of it, it will flow and live; if any one strike the top of it, it will flow and live. So filled with Life, with the Self, drinking in and rejoicing, it stands firm. But if the life of it leave one branch, that branch dries up; it leaves a second, that dries up; it leaves a third, that dries up; it leaves the whole, the whole dries up. Thus indeed, dear, thou must understand!" said he. "When abandoned by Life, verily, this dies; but Life itself does not die. For that soul is the Self of all that is; this is the Real, this the Self. That thou art, O Shvetaketu!"

"Let the Master teach me more!" said he.

"Let it be so, dear!" said he, "Bring me a fruit of that fig-tree."

"Here is the fruit, Master."

"Divide it in two," said he.

"I have divided it, Master."

"What do you see in it?" said he.

"Atom-like seeds, Master."

"Divide one of them in two," said he.

"I have divided it, Master."

"What do you see in it?" said he.

"I see nothing at all, Master."

So he said to him:

"That soul that thou perceivest not at all, dear,—from that very soul the great fig-tree comes forth. Believe then, dear, that this soul is the Self of all that is; this is the Real, this is the Self. That art thou, O Shvetaketu!"

"Let the Master teach me more!" said he.

"Let it be so, dear!" said he.

"Put this salt in water, and come to me early in the morning."

And he did so, and the Master said to him:

"That salt that thou didst put in the water last night—bring it to me!" And looking for its appearance, he could not see it, as it was dissolved in the water.

"Taste the top of it," said he; "how is it?"

"It is salt," said he.

"Taste the middle of it, said he; how is it?"

"It is salt," said he.

"Taste the bottom of it," said he; "how is it?"

"It is salt," said he.

"Take it away, then, and return to me."

And he did so, but that exists for ever. And the Master said to him:

"Just so, dear, you do not see the Real in the world. Yet it is here all the same. And this soul is the Self of all that is, this is the Real, this the Self. That thou art, O Shvetaketu!"

"Let the Master teach me more!" said he.

"Let it be so, dear!" said he.

"Just as if they were to blindfold a man, and lead him far away from Gandhara, and leave him in the wilderness; and as he cried to the east and the north and the west: I am led away blindfolded; I am deserted blindfolded. And just as if one came, and loosening the bandage from his eyes, told him: In that direction is Gandhara; in that direction you must go. And he asking from village to village like a wise man and learned, should come safe to Gandhara. Thus, verily, a man who has found the true Teacher, knows. He must wait only till he is free, then he reaches the resting-place. And that soul is the Self of all that is; this is the Real, this the Self. That thou art, O Shvetaketu!"

"Let the Master teach me more!" said he.

"Let it be so, dear!" said he.

"When a man is near his end, his friends gather round him: Do you know me, do you know me? they say. And until Voice sinks back into Mind, and Mind into Breath, and Breath into Radiance, and Radiance into the higher Divinity, he still knows them. But when Voice sinks back into Mind, and Mind into Breath, and Breath into Radiance, and Radiance into the higher Divinity, he knows them not. And that soul is the Self of all that is, this is the Real, this the Self. That thou art, O Svetaketu!"

"Let the Master teach me more!" said he.

"Let it be so, dear!" said he.

"They bind a man and bring him: He has stolen, they say; he has committed theft. Heat the axe for the ordeal: and if he be the doer of it, he makes himself untrue; maintaining untruth, and wrapping himself in untruth, he grasps the heated axe; he burns, and so dies. But if he be not the doer of it, he makes himself true; maintaining truth, and wrapping himself in truth, he grasps

the heated axe; he burns not, and so goes free. And the truth that saves him from burning is the Self of all that is, this is the Real, this the Self. That thou art, O Shvetaketu!"

Thus he learned the truth; thus he learned it.

This is one of the most famed passages in the whole age-long literature of India. The three words: "That thou art!" form the fundamental text of all later Vedanta teaching, and are always cited with reverence and wonder, as the crown and final word of wisdom.

This passage illustrates the method already referred to, as fundamental in the thought of ancient India: the initiation of the disciple into the thought of the master; the transmission of the wisdom of the master in orderly succession to the disciple; thus forming a link in the "Guru-parampara chain," or apostolic succession. The names of the teachers in such chains of master and disciple are preserved in the matrix of the Upanishads, side by side with such dramatic passages as that just translated.

An even better illustration of what one may call initiation into wisdom is found in the Katha Upanishad, a part of which I shall try to translate:

Vajashravasa, verily, seeking favor, made a sacrifice of all he possessed. He had a son, also, by name Nachiketas. Him, though still a child, faith entered, while the gifts were being led up.

He meditated:

"They have drunk water, eaten grass, given up their milk, and lost their strength. Joyless worlds, in truth, he gains, who offers these."

He addressed his father:

"To whom, then, wilt thou give me?" said he.

Twice and thrice he asked him.

"To Death I give thee!" said he.

*Nachiketas ponders:*

"I go the first of many; I go in the midst of many. What is Death's work that he will work on me to-day? Look, as those that have gone before, behold so are those that shall come after. As corn a mortal ripens, as corn he is born again."

*Nachiketas comes to the House of Death; he speaks:*

"Like Fire, a pure guest comes to the house. They offer him water to assuage him. Bring water, O Death, Son of the Sun!

"Hope and expectation, friendship, kind words, just and holy deeds, sons and cattle, this destroys, for the foolish man in whose house a pure guest dwells without food."

*After three days Death comes. Death speaks:*

"As thou hast dwelt three nights in my house, without food, thou, pure guest and honorable—honor to thee, pure one, welfare to me—against this choose thou three wishes!"

*Nachiketas speaks:*

"That the descendant of Gotama may be at peace, well-minded, and with sorrow gone, towards me, O Death; that he may speak kindly to me when sent forth by thee; this, of the three as my first wish I choose."

*Death speaks:*

"As before will the son of Aruna, Uddalaka's son, be kind to thee, sent forth by me; by night will he sleep well, with sorrow gone, seeing thee freed from the mouth of Death."

*Nachiketas speaks:*

"In the heaven-world there is no fear at all; nor art thou there, nor does he fear from old age. Crossing over both hunger and thirst, and going beyond sorrow, he exults in the heaven-world.

"The heavenly fire thou knowest, Death, tell it to me, for I am faithful. The heaven-worlds enjoy deathlessness; this, as my second wish, I choose."

*Death speaks:*

"To thee I tell it; learn then from me, Nachiketas, finding the heavenly fire. Know thou also the obtaining of unending worlds, the resting-place, for this is hidden in secret."

He told him then that fire, the beginning of the worlds, and the bricks of the altar, and how many and how they are. And he again spoke it back to him as it was told; and Death, well pleased, again addressed him:

"This is thy heavenly fire, O Nachiketas, which thou hast chosen as thy second wish. This fire as thine shall they proclaim. Choose now, Nachiketas, thy third wish."

*Nachiketas speaks:*

"This doubt that there is of a man that has gone forth: 'He exists,' say some; and 'He exists not,' others say: a knowledge of this, taught by thee, this of my wishes is the third wish."

*Death speaks:*

"Even by the gods of old it was doubted about this; not easily knowable, and subtle is this law. Choose, Nachiketas, another wish; hold me not to it, but spare me this!"

*Nachiketas speaks:*

"Even by the gods, thou sayest, it was doubted about this; and not easily knowable is it, O Death. Another teacher of it cannot be found like thee. No other wish is equal to this!"

*Death speaks:*

"Choose sons and grandsons of a hundred years, and much cattle, and elephants and gold and horses. Choose the great abode of the earth, and for thyself live as many autumns as thou wilt.

"If thou thinkest this an equal wish, choose wealth and length of days. Be thou mighty in the world, O Nachiketas; I make thee an enjoyer of thy desires.

"Whatever desires are difficult to gain in the mortal world, ask all desires according to thy will.

"These beauties with their chariots and lutes—not such as these are to be won by men—be waited on by them, my gifts. Ask me not of death, Nachiketas!"

*Nachiketas speaks:*

"These fleeting things, O Death, wear out the vigor of a mortal's powers. Even the whole of life is short; thine are chariots and dance and song.

"Not by wealth can a man be satisfied. Shall we choose wealth if we have seen thee? Shall we desire life while thou art master? But the wish I choose is truly that!

"Coming near the unfading immortals, a fading mortal here below, and understanding, thinking on the sweets of beauty and pleasure, who would rejoice in length of days?

"This that they doubt about, O Death, what is in the great Beyond, tell me of that. This wish that draws near to the mystery, Nachiketas chooses no other wish than that!"

*Death speaks:*

"The better is one thing, the dearer is another thing; these two bind a man in opposite ways. Of these two, it is well for him who takes the better; he fails of his object, who chooses the dearer.

"The better and the dearer approach a man; going round them, the sage discerns between them. The sage chooses the better rather than the dearer; the fool chooses the dearer, through lust of possession.

"Thou indeed, pondering on dear and dearly loved desires, O Nachiketas, hast passed them by. Not this way of wealth hast thou chosen, in which many men sink.

"Far apart are these two ways, unwisdom and what is known as wisdom. I esteem Nachiketas as one seeking wisdom, nor do manifold desires allure thee.

"Others, turning about in unwisdom, self-wise, and thinking they are learned, fools, stagger, lagging in the way, like the blind led by the blind.

"The great Beyond gleams not for the child, led away by the delusion of possessions. 'This is the world, there is no other,' he thinks, and so falls again and again under my dominion.

"That is not to be gained even for a hearing by many, and hearing it many understand it not. Wonderful is the speaker of it, blessed the receiver; wonderful is the knower of it, taught by the blessed."

Most willingly would I continue the magnificent address of King Death, did space permit. But it seems better to comment on certain passages in what has been translated, and then to pass on to another of the dramatic pieces in the Upanishads.

To begin with, one cannot fail to be struck by the resemblance of the general situation in the Katha Upanishad to that in the dramatic fragment already translated, where King Pravahana addresses the old Brahman, Uddalaka Aruni. Here, again, we have the teacher trying the disciple, putting him off with "wishes of things mortal." In the former case it was: "store of gold, of cattle and horses, of slave-girls and tapestries and robes." The offer of Death is much the same: "Sons and grandsons, and much cattle, and elephants and gold and horses; these beauties, with their chariots and lutes, be waited on by them, my gifts!" This close resemblance long ago suggested to me a possible verbal emendation in the Sanskrit of the former passage. The accepted reading of the answer of the old Brahman is: *Vijñāyate; ha asti hiranyasya âpâtam go-ashvânân dâsinâm pravârânâm paridhânasya*. Instead of



*ha asti*, I should like to propose the reading: *Hasti-hiranyasya âpâtam*, that is, "store of elephants and gold," the compound *Hastihiranyam* occurring elsewhere twice in the Upanishads, in a sentence of just this kind; once, namely, in the Katha Upanishad, in the passage under discussion: *Shatâyushah putrapautrân vrinîshva, bahûn pashûn hasti-hiranyam ashvân*; and again in Chhandogya Upanishad, in the twenty-fourth section of the seventh chapter: *Go-ashvam iha mahimâ iti âchakshate hasti-hiranyam dâsa-bhâryam*, and so on.

If this proposed reading be acceptable, then we have a set phrase, a sacramental formula, fairly the equivalent of "the kingdoms of this world and the glory of them," in the Temptation in the Wilderness, which bears a close resemblance to the temptation of Nachiketas by the Lord of Death. There is also a strong suggestion of kinship in the sacrifice of the only son, who, descending into the house of Death, rises immortal on the third day.

It is quite clear that Death is imparting to Nachiketas the same teaching which King Pravahana, son of Jivala, revealed to Uddalaka Aruni: the twin teaching of Liberation and Rebirth. "The great Beyond gleams not for the child, led away by the delusion of possessions. 'This is the world, there is no other,' he thinks, and so falls again and again under my dominion;" enters, in fact, the circle of necessity, the chain of repeated death and rebirth, of forced Reincarnation. On the other hand is the great Beyond, the path of the gods, and full Liberation.

We get a great deal of additional light on this antithesis from yet other dramatic pieces in the Upanishads, as, for example, from certain of the answers in Prashna Upanishad, which is, perhaps, the most consistent instance of the dramatic form in the Upanishads. This Upanishad depicts six disciples coming to the master Pippalada with fuel in their hands, as who should say: "Give light! We are

ready to be enkindled!" The sage tried them, saying: "Remain yet a year in fervor, service of the Eternal, and faith. Ask whatever questions you will; if we know them we shall declare all to you!"

The first is: "Master, whence are all these beings brought forth?" The answer is an eloquent description of the World-soul, the Life, from which all beings come forth. In that answer, we come on the following remarkable passage, which strongly reminds us of the answer of King Pravahana:

"The year is a Lord of beings. His two paths are the southern and the northern. Therefore they who worship, thinking that it is fulfilled by sacrifice and gifts, win the lunar world. They verily return again. Therefore these sages who desire beings, turn to the south. For this is the path of substance, the path of the fathers.

"But they who by the northern way seek the Self by fervor, service of the Eternal, faith and knowledge, they verily win the sun. This is the home of lives; this is the immortal, fearless, supreme way. From it they do not return again."

This is, of course, exactly the antithesis in the teaching of King Pravahana. On the one hand, the way of self-seeking ritual, the way of the fathers, the lunar path, the way of Reincarnation. On the other, the way of pure aspiration, the way of the gods, the solar path, the way of full Liberation.

What this Liberation really meant to the teachers whose words we are translating, we can better understand from further answers in the same Prashna Upanishad. Thus the fourth question addressed to the Master Pippalada is:

"How many powers sleep in the man? How many wake in him? Who is the bright one that sees dreams? Whose is that bliss, and in whom are all these set firm?"

The Master answered him:

"As the rays of the sun at setting all become one in his shining orb, and when he rises they all come forth again; so all becomes one in the higher bright one, Mind.

"Therefore the man hears not, nor sees, nor smells, nor tastes, nor touches, nor speaks, nor takes, nor enjoys, nor puts forth, nor moves. He sleeps, they say....

"The life-fires verily wake in this dwelling....

"So this bright one in dream enjoys greatness. The seen, as seen he beholds again. What was heard he hears again. And what was enjoyed by the other powers he enjoys again by the other powers. The seen and unseen, heard and unheard, enjoyed and un-enjoyed, real and unreal, he sees it all; as All he sees it.

"And when he is wrapped by the Radiance, the bright one no longer sees dreams. Then within him that bliss arises. And, dear, as the birds come to the tree to rest, so all this comes to rest in the higher Self....

"For this Self is the seer, toucher, hearer, smeller, taster, thinker, knower, doer, the perceiving spirit. And this is set firm in the supreme, unchanging Self.

"He reaches the unchanging Supreme who knows that shadowless, bodiless, bloodless, bright, unchanging One. He, dear, becomes all-knowing, becomes the All."

We come now to the fifth answer, in which the symbolism of the mystic syllable Om is interwoven with the teaching, in a manner which suggests the probably later Mandukya Upanishad. The fifth question is:

"He among men, who, to the end of his life, meditates on the mystic syllable Om,—what world will he gain by it?"

The Master answered him:

"This mystic syllable Om, is for the higher and lower Eternal. Therefore the wise man, by dwelling on this, reaches one of these: if he meditates on the first measure, enlightened by it, he is quickly reborn in the world....

"And if he dwells on it in his heart with two measures, he is led to the middle world by the liturgies. He wins the lunar world, and after enjoying brightness in the lunar world, he returns again.

"And he who with three measures meditates on the mystic Om, and thereby meditates on the supreme Spirit, is endowed with Radiance, with the sun; as a serpent is freed from its slough, he is, verily, freed from sin. He is led by the chants to the world of the Eternal. He beholds the indwelling spirit above the highest assemblage of lives."

Here we have an outline of an idea which is vital to a right understanding of the thought of the Upanishads: the idea, namely, that there is a relation, amounting almost to an identity, between the states or strata of consciousness during life, and the states or strata of consciousness passed through by the soul after death; so that, by a deep study of the states of consciousness experienced during life, we may learn much of the states of consciousness after death.

Briefly, the result seems to be this: The dream-state, which is built up of impressions received during waking consciousness, of "things seen, things heard, things enjoyed," finds its parallel in a dream-state which the soul enters after death, in which it may behold dreams terrible or beautiful. But in either case, these dreams are simply the continuation of the mind-states experienced during bodily life; and, as soon as the impetus thus carried over exhausts itself, as soon as the subjective capital runs out, the soul returns to rebirth; or, to put the same thing in another way, the mind-state of physical life and sensation once more prevails. This dream-world between two lives is precisely the lunar world, the world of the fathers, of the Upanishads; lunar, because it shines with reflected light, and waxes and wanes; the world of the fathers, because it is identified with the world of the shades, which is the real teaching of the Vedic hymns, the shadow-land most eloquently described in the tale of Jaratkaru, at the beginning of the Mahabharata.

There is a like relation between the realm beyond dreams and the path of liberation. And it is just at this point that the Indian teaching is most original and suggestive. In a recent article, Sir Oliver Lodge, who has long been investigating the consciousness of the shadow-land, used a remarkable phrase. He spoke of the strata of consciousness, and particularly of the strata of dream and genius. We have just described the stratum of dream.

It is evident that, when we come to the realm of consciousness beyond dream, we are entering what Sir Oliver Lodge calls the stratum of genius. And we shall find it a very suggestive thought to follow out, that genius is really the revelation of a higher realm or stratum of consciousness, continuous with the strata of waking and dream, and above them;—a stratum always potentially present, yet rarely reached, as we know that genius is rare, the stratum of consciousness, perhaps, to which was given the name “the kingdom of heaven which is within”; and which is so often identified in the Upanishads with “the heaven-world.” It is, doubtless, the same as “the mother sea of consciousness” in the fine phrase of William James, which he conceives as being continuous with our physical consciousness, though we so rarely attain it. This deeper and immortal consciousness may be reached in life, in illumination. It may be reached after death, in complete Liberation, “from which there is no return.”

By far the best and most beautiful treatment of this region of thought and understanding in the Upanishads is that in the third and fourth part of the Brihad Aranyaka Upanishad, in the dramatic dialogue between Janaka, King of the Videhas, and the sage Yajnavalkya. So admirable is this passage, and so completely characteristic of the dramatic element in the Upanishads, that I shall try to translate a considerable part of, to conclude the present survey. It reaches such a high level as pure literature, that no comment or elucidation is needed. Throughout, the dialogue speaks for itself:

To Janaka, king of the Videhas, came Yajnavalkya, saying, “I will not speak with the king!” But when Janaka, king of the Videhas, and Yajnavalkya debated together at the offering of the sacred fire, Yajnavalkya offered the king a wish. The king chose: To ask questions according to his desire. Yajnavalkya assented, and the king first asked:

"Yajnavalkya, what is the light of the Spirit of man?"

"The sun is his light, O king!" he answered. "With the sun as his light he rests, goes forth, does his work, and returns."

"This is so in truth, Yajnavalkya. But when the sun it set, Yajnavalkya, what is then the light of the Spirit of man?"

"The moon then becomes his light;" he answered. "With the moon as his light he rests, goes forth, does his work and returns."

"This is so in truth, Yajnavalkya. But when the sun it set, Yajnavalkya, and the moon is also set, what is then the light of the Spirit of man?"

"Fire then becomes his light;" he answered. "With fire as his light he rests, goes forth, does his work, and returns."

"This is so in truth, Yajnavalkya. But when the sun it set, Yajnavalkya, and the moon is also set, and the fire sinks down, what is then the light of the Spirit of man?"

"Voice then becomes his light;" he answered. "With voice as his light he rests, goes forth, does his work, and returns. Therefore in truth, O king, when a man cannot distinguish even his own hand, where a voice sounds, thither he approaches."

"This is so in truth, Yajnavalkya. But when the sun is set, Yajnavalkya, and the moon is also set, and the fire sinks down, and the voice is stilled, what is then the light of the Spirit of man?"

"The Soul then becomes his light," he answered. "With the Soul as his light he rests, goes forth, does his work, and returns."

"What is the Soul?"

"It is the Consciousness in the life-powers. It is the Light within the heart. This Spirit of man wanders through both worlds, yet remains unchanged. He seems only to be wrapt in imaginings. He seems only to revel in delights.

"When he enters into rest, the Spirit of man rises above this world and all things subject to death. For when the Spirit of man comes to birth and enters a body, he goes forth entangled in evils. But rising up at death, he puts all evils away.

"The Spirit of man has two dwelling-places: this world, and the other world. The borderland between them is third, the land of dreams. While he lingers in the borderland, the Spirit of man beholds both his dwellings, this world and the other world. And according as his advance is in the other world, gaining that advance the Spirit of man sees evils or delights.

"When the Spirit of man enters into rest, drawing his material from this all-containing world, felling the wood himself and him-

self building the dwelling, the Spirit of man enters into dream, through his own shining, through his own light. Thus doth the Spirit of man become his own light.

"There are no chariots there, nor steeds for chariots, nor roadways. The Spirit of man makes himself chariots, steeds for chariots, and roadways. Nor are any delights there, nor joys and rejoicings. The Spirit of man makes for himself delights and joys and rejoicings. There are no lotus ponds there, nor lakes and rivers. The Spirit of man makes for himself lotus ponds, lakes and rivers. For the Spirit of man is Creator.

"And there are these verses:

"Leaving the bodily world through the door of dream, the sleepless Spirit views the sleeping powers. Then clothed in radiance, returns to his own home, the gold-gleaming Genius, swan of everlasting.

"Guarding the nest beneath through the life-breath, the Spirit of man rises immortal above the nest. He soars immortal according to his desire, the gold-gleaming Genius, swan of everlasting.

"Soaring upward and downward in dreamland, the god makes manifold forms; now laughing and rejoicing with fair beauties, now beholding terrible things.

"They see his pleasure-ground, but him none see. Thus goes the saying: Let none awaken him that sleeps; for he is hard to heal, to whom the soul returns not.

"They also say that dream is a province of waking. For whatever he sees while awake, the same he sees in dream. Thus the Spirit of man becomes his own light.

"And when he has taken his ease in the resting-place of dream, moving to and fro, and beholding good and evil, the Spirit of man returns again by the same path, hurrying back to his former dwelling-place in the world of waking. But whatever the Spirit of man may behold there, returns not after him, for the Spirit of man is free, and nought adheres to the Spirit."

"This is so, in truth, Yajnavalkya. I give a thousand cattle to the teacher. But speak of the higher wisdom, that makes for Liberation."

"And when he has taken his pleasure in the waking world, moving to and fro and beholding good and evil, the Spirit of man returns again by the same path, hurrying back to dreamland.

"As a great fish swims along one bank of the river, and then along the other bank, first the eastern bank, and then the western,



so the Spirit of man moves through both worlds, the waking world and the dream world.

"Then as a falcon or an eagle, flying to and fro in the open sky and growing weary, folds his wings and sinks to rest, so of a truth the Spirit of man hastens to that world where, finding rest, he desires no desire and dreams no dream.

"And whatever he has dreamed, as that he was slain or oppressed, crushed by an elephant or fallen into an abyss, or whatever fear he beheld in the waking world, he knows now that it was from unwisdom. Like a god, like a king, he knows he is the All. This is his highest world.

"This is his highest joy. He has passed beyond all evil. This is his fearless form. And as one who is wrapt in the arms of the beloved, knows naught of what is without or within, so the Spirit of man wrapt round by the Spirit of Inspiration, knows naught of what is without or within. This is his perfect being. He has won his desire. The Soul is his desire. He is beyond desire. He has left sorrow behind.

"Here the father is father no more; nor the mother a mother; nor the worlds, worlds; here the scriptures are no longer scriptures; the thief is a thief no more; nor the murderer a murderer; nor the outcast an outcast; nor the baseborn, baseborn; the pilgrim is a pilgrim no more, nor the saint a saint. For the Spirit of man is not followed by good, he is not followed by evil. He has crossed over all the sorrows of the heart.

"The Spirit sees not; yet, seeing not, he sees. For the energy that dwelt in sight cannot cease, because it is everlasting. But there is no other besides the Spirit, or separate from him, for him to see. . . . For only where there is separation may one see another, may one taste another, may one speak to another, may one hear another, may one touch another, may one know another. But the one Seer is undivided, like pure water. This, O king, is the world of the Eternal. This is the highest path. This is the highest treasure. This is the highest world. This is the highest bliss. All beings live on the fragments of this bliss.

"He who amongst men is rich and happy, a lord well endowed with all wealth, this is the highest bliss of mankind. But a hundred-fold greater than the bliss of man is the bliss of the departed who have won paradise . . . and of him who has heard, who has risen from darkness, who is not stricken by desire. This is his highest bliss. This, O king, is the world of the Eternal!"



Thus spoke Yajnavalkya.

And the king replied: "I give the teacher a thousand cattle. But speak of the higher wisdom that makes for Liberation!"

And Yajnavalkya feared, thinking: "The wise king has cut me off from all retreat!" He said:

"And when he has taken his pleasure in dreamland, moving to and fro, and beholding good and evil, the Spirit of man returns again by the same path, hurrying back to his former dwelling-place in the world of waking.

"Then as a wagon heavy-laden might go halting and creaking, so the embodied soul goes halting, overburdened by the Spirit of Inspiration, when it has gone so far that a man is giving up the ghost.

"When he falls into weakness, whether it be through old age or sickness he falls into weakness, then like as a mango or the fruit of the wave-leaved fig or of the holy fig-tree is loosened from its stem, so the Spirit of man is loosed from these bodily members, and returns again by the same pathway to its former dwelling-place in the life.

"Then like as when the king is coming forth, the nobles, officers, charioteers and magistrates make ready to serve him with food and drink and shelter, saying: the king is coming forth, the king is at hand; so all the powers make ready to wait on the soul, saying: the soul is coming forth, the soul is at hand.

"And like as when the king will go forth, the nobles, officers, charioteers and magistrates gather about him; so verily at the time of the end all the life-powers gather round the soul, when it has gone so far that a man is giving up the ghost.

"When he falls into a swoon, as though he had lost his senses, the life-powers are gathering in round the soul; and the soul, taking them up together in their radiant substance, enters with them into the inner heart....

"Then the point of the heart grows luminous, and when it has grown luminous, it lights the soul upon its way:.... The soul becomes conscious and enters into Consciousness.

"Then his wisdom and works take him by the hand, and the knowledge gained of old. Then as a caterpillar when it comes to the end of a leaf, reaching forth to another foothold, draws itself over to it, so the soul, leaving the body, and putting off unwisdom, reaching another foothold there, draws itself over to it.

"As a worker in gold, taking an ornament, moulds it to another

form, new and fairer; so in truth the soul, leaving the body, and putting off unwisdom, makes for itself another form new and fairer: a form like the forms of departed souls, or of the seraphs, or of the gods, or of the creators, or of the Eternal, or of other beings.

"The soul of man is the Eternal. It is made of consciousness, it is made of feeling, it is made of life, it is made of vision, it is made of hearing; it is made of the earth, it is made of the waters, it is made of the air, it is made of the ether, it is made of the radiance and what is beyond the radiance; it is made of desire and what is beyond desire, it is made of wrath and what is beyond wrath, it is made of the law and what is beyond the law; it is made of the All. The soul is made of this world and of the other world.

"According as were his works and walk in life, so he becomes. He that does righteously becomes righteous. He that does evil becomes evil. He becomes holy through holy works and evil through evil.

"As they said of old: Man verily is formed of desire; as his desire is, so is his will; as his will is, so he works; and whatever work he does, in the likeness of it he grows.

"There is this verse:

"Through his past works he shall return once more to birth, entering whatever form his heart is set on. When he has received full measure of reward in paradise for the works he did, from that world he returns again to this, the world of works.

"Thus far of him who is under desire. Now as to him who is free from desire, who is beyond desire, who has gained his desire, for whom the Self is his desire. From him the life-powers do not depart. Growing one with the Eternal, he enters into the Eternal.

"There is this verse:

"When all desires that were hid in the heart are let go, the mortal becomes immortal, and reaches the Eternal.

"And like as the slough of a snake lies lifeless, cast upon an ant-hill, so lies his body, when the spirit of man rises up bodiless and immortal, as the Life, as the Eternal, as the Radiance."

"I give a thousand cattle to the teacher!" Thus spake Janaka, king of the Videhas.

There is this verse:

"The small old path that stretches far away has been found and followed by me. By it go the Seers who know the Eternal, rising up from this world to the heavenly world."

NEW YORK.

CHARLES JOHNSTON.

## A PHILOSOPHICAL ASPECT OF SCIENCE.

ONE of the earliest and most persistent efforts of the human mind has been that of finding some common basis in things, some receptacle to catch the stream of change: days and nights, this world, other worlds, life, death, decay, regeneration. To us it would be intolerable to accept the idea of a sieve-like universe, through which events poured into some inaccessible limbo, never to be recovered again. We expect things to be related, held together somehow, somewhere, in spite of apparent disruption, disappearance, or total loss.

On this expectation rests the whole procedure of knowledge, which for purposes of illustration I propose to confine to that involved in scientific methods.

Let us start with an experience. A certain combination of events gives me pain. Deep-seated in my organism is dread of pain and roughly speaking and in crudest terms, I am a being composed, for survival-fitness, of three factors: horror of pain, desire for pleasure, and some power of self-adjustment. Hence a painful experience is not merely suffering, but also learning; in striving to avoid, I strive to change the conditions of my world, and my will, however puny, is exerted to that end.

How much I manipulate it depends on my own structure, imagination, will. To a creature devoid, e. g., of locomotion, the range of adjustment is restricted. Almost passive, it suffers and succumbs, or chances to survive; but its range of pleasure, pain, or curiosity is limited as

well. The more complex the organism, the more complex the world of its reactions, interpretations and experiences. For instance, a burnt child dreads the fire, but its simple soul is satisfied to avoid the fire; it has as yet conceived no ambition to explore the mysteries of heat, of atmospheric pressure, and molecular activity!

These elementary remarks may introduce my thesis. I propose to urge: (1) that the accumulation of knowledge, the intricate structure of science, is ultimately for this purpose,—as far as may be to order and control life, and (2) that in so far as its formulations have achieved their aim, it has been by the use of abstraction. Incidentally we shall see how the naïve mind is apt to accept these formulations as true in a sense which science is not concerned to assert, and which it could never achieve;—I mean accepts them as actual records of what is believed to be the real world, and revelations that reproduce the intimacies of Being.

But lest I should range over the whole field of knowledge let me restrict myself to the fortunes of some scientific hypotheses; and finally let me ask if truth in the above sense can ever be arrived at by science, and whether a decision in the negative necessarily amounts to skepticism.

You may remember the old Greek story of the atheist Diagoras, when he was shown over a temple to Poseidon, full of the olive offerings of sailors whom their prayers had saved from shipwreck. Unabashed he turned and said: "Show me rather the offerings of those who prayed and perished."

Is not our admiration for the successes of science somewhat similar and are not its failures erased from the records of its triumphs? Has it not as persistently disappointed the human craving for finality as the wildest fancies of philosophy? At how many points in its development have we not been tempted to think, "Here is finality,

here is the key to the inmost shrine," and found that we were still wandering in the antechambers of the labyrinth?

Let us briefly review the vicissitudes in the history of "matter." Newton defined matter thus: "It seems probable to me that God in the beginning formed matter in solid, massy, hard, impenetrable, movable particles. . . and that these primitive particles being solids are incomparably harder than any porous bodies compounded of them; even so hard as never to wear or break in pieces, no ordinary power being able to divide what God himself made one in the first creation." Thus atoms were absolutely inelastic, and according to the theory of essential disparity of matter and motion, they were *inert*. A third character, absolute *homogeneity*, was a necessary conclusion from the fact that all bodies, of whatever they were composed, were acted upon by gravity in exactly the same manner. Thus we have particles which are mathematically though not physically divisible, absolutely solid, inert and homogeneous.

Many experiments justified this definition. Did all? First, according to the kinetic theory of gases, solidity is impossible. In collision of ordinary bodies or particles, the practical loss of apparent motion is accounted for by the conversion of an unchanged quantum of energy into an internal agitation of the minute parts composing the colliding bodies. Atoms are by definition destitute of parts, hence in a collision of atoms, no such compensation is possible, and the physicist is faced with the alternatives, either of denying the solidity of atoms in the Newtonian sense, or of renouncing the principle of the conservation of energy. The first is preferred. To make a long story short, Newton's rigidity of atoms, like his theory of contact action—the only thoroughly mechanical explanation of the operations of one body upon another—proving inadequate, his mechanical atoms were replaced by dynamical ones.

As defined by Boscovich and the French School, an atom is no longer a substantial entity, but a mathematical point, a center of force, and "matter" is a crowd of such points, endowed with inertia and powers of attraction and repulsion.

Now the difficulty which beset Newton's theory of contact action, viz., how to explain "action at a distance," forced from him a descriptive apparatus, setting forth the behavior of related bodies, but not attempting to explain it. On his own atomic theory he could not do so. This apparatus was by Boscovich taken for reality;—he thus precisely inverted Newton's procedure. In Professor Ward's words, "The solid, primitive particles of various sizes and figures in which Newton believed, were rejected; and the inherent forces acting through a vacuum which he disclaimed as absurd, were accepted as the reality to which all the physical properties of matter were due."

But this inversion of the purely mechanical theory again raised difficulties. For to the "mass points" were attributed intrinsic force, a departure from the fundamental idea of the indifference of matter to motion, and also from the conception of force as something arising only in the relation of two bodies, not present in one alone.

Lord Kelvin's theory of vortex atoms was an endeavor to combine the mechanical and dynamical. Again to quote Professor Ward, "There is (in the kinetic theory) no action at a distance, but then there is no empty space: action and reaction are to be explained, not by impact, but by the physical continuity of the plenum. There are no hard atoms; yet the atom occupies space, and is elastic in virtue of its rotatory motion."

I must not spend much more time on this development of the new upon the almost total wreckage of the old. I will merely add that Kelvin's theory is moribund, too. For his theory called for a "homogeneous, incompressible, perfect

fluid" in which vortex atoms are rings formed by rotational movements. But how can mere disembodied motions possess inertia? As Maxwell says, "Though the primitive fluid is the only true matter according to the kinetic ideal . . . yet that which we call matter is not the primitive fluid itself, but a mode of motion of that primitive fluid. In [this] theory, therefore, the mass of bodies requires explanation. We have to explain the inertia of what is only a mode of motion, and inertia is a property of matter, not of modes of motion."

To return once more to the older view of atoms, the theory of the homogeneity of matter issued in the definition of its parts as in all respects equal, viz., the atoms themselves remain as elements utterly devoid of finality, or in Spencer's words, "The properties of the different elements result from difference of arrangement, arising by the compounding and recomounding of ultimate homogeneous units." But the science of chemistry is a denial of this, as we know. And what occupies the scientific field to-day as a theory of matter?

The old atom, either as a physically irreducible particle, or a point of force, has disappeared. In its stead there is a minute system of electrical charges, called electrons, positive and negative, say 68,000 of these constituting one atom, and separated by what is analogous to interstellar, interplanetary space. As Sir Oliver Lodge picturesquely puts it, the relative sizes of electron and atom may be gathered from this: Imagine an electron of one inch in size, your atom would be a mile and a half in diameter!

If Newton's atoms were imperceptible, these elemental and infinitely smaller bodies almost stagger the imagination. And with their advent for various reasons there comes again a disturbing doubt as to the validity of well-established scientific principles, such as conservation of



energy, and conservation of mass. But perhaps I have given concrete illustrations enough to show how over and over again the most fundamental "truths" of science have been superseded, buried under fresh growth.

Two points have perhaps been noticed:

1. The increasing tendency of science to recede in its formulations, from anything which could conceivably be a matter of actual sense experience; starting with solid particles, as a description of the basis of things, it tends to strip these of perceptible characters and to melt and fade the living, qualitative world into a mathematical scheme which is purely quantitative and abstract.

2. The fact that, in spite of this tendency, science is no mere cobweb of finely spun speculations, but is sharply checked and corrected by the very sense experience it apparently ignores.

How are these apparently contradictory facts compatible?

Science is no idle game, its unwearying speculations are inspired, sustained and tested by a single purpose, that of harmonizing and controlling life. This purpose may be defined from various points of view: e. g., from the esthetic, which rejoices in an interrelated and orderly system of thought; or the practical which seeks the ability to reproduce experiences, to widen the scope of life, increase the complexity of its relations perhaps, but above all to maintain existence with some degree of harmony and security.

Therefore science is justified if its methods succeed in realizing this ideal. The savage with his untutored mind, his superstitions, his investing of nature and the elements with erratic and wild powers, falls short of such security as we seek to possess. He knows his own capricious self, and his consistently anthropomorphic imagination attrib-



utes to his world just such caprice, — it is revengeful, changeable, wild, like himself.

But science de-humanizes the world. Whereas, in our indecisions, our caprice, our fluctuating wills, we are not unlike the savage still, yet our world, *for science*, is purged of all passions, all chance, all uncertainty. There is no minutest particle of matter, no faintest pulse of energy but is held or moved according to fixed immutable law. If e. g., an astronomical calculation is discarded, it is not because we suspect the solar system of capricious behavior, but ourselves of superficial observation, or mistaken interpretation. The great world stands fast in the absolute regularity of law, while we try again and again to formulate its secret.

But herein lies the strange paradox of science—we *control* life only by the partial abstraction from life. Science must abstract, in order that we may argue from one case to another. The abstract law which omits all the particular circumstances of every fact gains thereby applicability to fresh fact. The more phenomena it can relate under one law, the more successful is the law, and the permanence of any law is in direct proportion to its universality (cf. Poincaré on "Laws and Principles").

Suppose a given experiment  $x$ , in which there are a thousand factors, the influence of the stars, known and unknown, the light of day, the atmospheric conditions, actual governments among men, the various religions, etc., elements uncountable, and yet present. What does science do? The elimination of the irrelevant being its ideal, it clips and clears and ignores, till perhaps just one element remains, e. g., *weight*. The falling body  $x$  will move after one second, with an acceleration of 32 feet per second.

Another experiment is made,—with a totally different body  $y$ . Meanwhile the earth has whirled away through space, the daylight has gone, the stars in unfathomed re-

cesses of invisibility have changed their relation to our world, every element known and unknown is different in however slight and subtle a way; and yet, for gravity, body  $y$  falls to the earth exactly as did body  $x$ , there is no faintest fluctuation of inexorable sameness. For it a rock is precisely the equivalent of a living organism.

Look again at the history of science. Which have been the unstable hypotheses? Those which deal with more or less unimportant details of internal structure or with any subsidiary phenomena. As I have said, the more general and simple a so-called law is, the more is its permanence guaranteed, until like that of the conservation of energy it is put out of the reach of criticism, and is no longer a "law," but a "principle."

Scientists use every trick and expedient to leave this undisturbed. As it has been well put, "we postulate an *unknown supplement* of the experienced, in order to prevent facts from refuting a cherished assumption." Let me quote Professor Thomson: "In electrical phenomena we are brought into contact with cases of interaction between bodies charged with electricity, in which the action of the first on the second is not equal and opposite to the reaction of the second on the first. In such cases we suppose that both bodies are connected with the ether round them, and that Newton's third law holds when we consider the ether and the two bodies as constituting the system under examination. From this point of view, the potential energy of an electrical system may be regarded as due to its connection with an *invisible subsidiary* system, possessing kinetic energy equal in amount to the potential energy of the original system."

This is what I began by describing as a *receptacle* for all phenomena, a confine within which minor disturbances may be expected, but which itself is beyond the reach of such disturbance. I do not withdraw my assertion that

science is checked by sense experience, and in minor matters it is constantly being transformed. But sense experience is aided and harmonized by nothing so effectively as by these more general principles. Hence we refuse to quarrel with their bleak and lifeless abstraction. We see then how such apparently disrespectful juggling with so-called "fact" is justified. It is justified because it allows us to reproduce, modify, predict, certain groups of experiences at will, and this is the supreme end and aim of science: control.

Look at what Aristotle called the *ἰδιαί ἀρχαί*, or special principles of the sciences. According to him they were irreducible to one another, and we have not disproved his contention. Biology and physics do not wholly agree. Euclidean space and non-Euclidean or curved space each possesses its special space-relations, and axioms in the one system become absurdities in the other. A more intimate instance is this,—the atomic hypothesis as to the nature of matter is not reducible to a mathematical hypothesis, yet they both lead to successful manipulations of the real. In our theoretical world the lion and the lamb lie down together; so long as the various theories succeed in controlling those portions of our experience assigned to them, why should we be over-particular in a demand that they shall all be convertible into the same formula or hypothesis?

You will remember that I spoke of Newton's atomic theory as having "proved inadequate." I hope I have made myself clear as to what I mean by that word. A theory may be beautifully consistent with itself and yet be inadequate in the sense I have tried to describe. Let me add another illustration. A theory is not discarded out of mere caprice; like the Ptolemaic system, a formulation may work perfectly well until a widening experience brings in so many fresh factors that any calculation which includes

them becomes too cumbersome for convenient use. Then is the moment for such scientific upheavals as that involved in passing from the Ptolemaic to the Copernican system. The facts observed and classified in the old order yesterday, assemble to-day under new names and with reversed rank. Yesterday the earth was central, to-day the sun is the point of reference for the whole solar system. Nothing has fallen out of the heavens; the planets and stars remain in their old places, but we describe their relations differently, and this altered description is forced from us by their behavior. The alteration justifies itself, because it enables us to calculate and predict with increased facility and success.

The first two objects of this paper I have laid before you:

1. The fact that scientific procedure is purposive, its end and justification, control of our experience.

2. And that to attain this control it must be abstract, eliminating whatever is irrelevant to the special purpose in view.

Finally I proposed to ask whether science can be said to penetrate into the very heart of Being,—reproducing its true nature?

Let us put the question in this form: Is it true that in the objective world which goes on its way more or less regardless of me and my science, is it literally true that there are atoms, electrons, perfect fluids, ethers, etc. etc.? It seems to me there is only one answer: we do not know; we know no more than the merest savage. By a curious paradoxical trick, we have so defined our world as to put it quite beyond the reach of refutation by sense-experience. We assert of it, and minutely describe parts of whose individual nature we can never, *ex hypothesi*, have actual sensible experience, as of one individual with another.

Suppose a solar giant with short sight who required a

crowd composed of nearly all the inhabitants of Europe before he could even see it at all. He might by some happy guess suggest that its black mass was composed of atoms, but how far would you as one of the component atoms admit that this giant really knew anything about you?

For science treats of bare averages, and we know not how far the exactness of its (minor) laws would go unchallenged if they took account of individual changes among infinitesimal bodies.

Think of how peculiarly erratic we are in our methods. We so define the real constitution of matter as to shut ourselves out from any possible knowledge of it, in the sense I have tried to describe. We lay down the law of the conservation of energy, let me say arbitrarily, and this law is based on what assumptions? First, that from our tiny corner of this immense world, we can by analogy infer with accuracy the nature of all the vast remainder; secondly, that the tiny corner plus the vast remainder together possess a certain finite though unknown sum of energy, and that this sum is absolutely constant. By what right do I make such assumptions? Take another instance. Although the law of causality is gradually being extruded from science which more and more contents itself with mere description, it still has a very respectable reputation. But is it an accurate law? What it asserts is this: reproduce all the conditions of a certain phenomenon, that phenomenon will reappear. But the conditions never can be reproduced, not in countless billions of cycles; for admitting the bold assumption that almost every factor can be reproduced, the conditions would at any rate be assembled in another time. And by what right do we assume that another time has no effect upon the rest of the conditions? none upon the resultant phenomenon? Strictly speaking by no right whatever.

There is another disheartening weakness of science:

do what we may we never seem to know the thing examined, in its very intimacy,—everything is ultimately defined by what it does to something else. Mass is defined in terms of force, force in terms of mass. Space is relative, so is time. Motion is known not as absolute, but as something which arises out of relation. Body A might whirl away through empty space for ever and not be in motion in the sense of perceiving it, or being perceived as moving. Add body B, whirling faster or slower, and the phenomenon of motion emerges.

Of space Poincaré says: "It is impossible to imagine pure empty space. . . ."; "whoever speaks of absolute space, uses words devoid of meaning. . . ."

"For example I am at a certain point in Paris, the Place du Panthéon, and I say I will come back *here* to-morrow. If I am asked, do you mean you will return to the same point in space? I shall be tempted to answer 'Yes'; and yet I should be wrong in saying so. For between now and to-morrow the earth, carrying with it the Place du Panthéon, will have traveled more than two million kilometers. If I wish to be precise, this fact does not help me. For these two million kilometers have been traveled by our earth in relation to the sun. The sun again is in motion relatively to the Milky Way, and the Milky Way itself is doubtless moving though with a rapidity inaccessible to our knowledge. Thus we are in complete ignorance, and shall always be so, of exactly how much the Place du Panthéon moves in one day. What I should say is this: To-morrow I shall again see the dome of the Panthéon, and if there were no such dome, my phrase would be meaningless and space would vanish."

He gives another illustration, that of Delboeuf:

"Suppose that in one night all the dimensions of the universe increased one thousand times, what would be my sensations the next morning? I should be aware of no

change whatever. For all the relations of one thing to another would have retained their precise proportions, and I should remain forever in ignorance of this titanic transformation."

I hope all these examples have not been confusing. I have merely tried to point out that to serious thought it is impossible to accept naively the concepts of science, accept them I mean as the true counterparts, in thought, of what goes on in the real objective world.

It cannot be put better than by Prof. Thomson, in his brilliant dictum, "Scientific theory is a policy not a creed." Must we turn skeptics, must we believe that all effort really to know is futile, bound to ultimate failure? I think not. Let us forget all that we have been criticising for a moment, and simply see what really takes place, when in the light of scientific directions as to temperature, atmospheric pressure, etc., I try to boil an egg. I may need the latest refinements of physics to effect my purpose, but they are ultimately tested by the fact that my egg *does* boil, and that their use leads to a satisfying breakfast.

All I wish and need is to carry out my purpose. If I find it easier to bring about a desired complex of relations by treating my world *as if* it swarmed with electrons, then I say "it is constituted thus." But I need not believe the electrons in my scientific imagination have a real counterpart *in what actually goes on*.

If I can penetrate into the universe by these methods, then we may say in a very profound sense, that we do understand it. Our formulations will forever fail if we demand of them actual reproduction of the unending richness and complexity of even our minute plot of this unmeasured universe. They will not fail, if we understand that they are instruments and symbols and not reproductions, and ask of them only assistance in harmonizing and integrating our experience. And so the lesson of the in-



stability of scientific theories is not necessarily a skeptical one, and at the risk of repetition let me emphasize this point. I say that the transformations of scientific theory do not necessarily lead to skeptical conclusions. And why? For two reasons: First, because they are not random, but *progressive*, because they always mean more successful control of experience; secondly, because they are not merely capricious and fanciful, but *rather are forced from us by the world with which we deal*. Though it is sometimes friendly in allowing our intimacy, amiable in appropriating some of our interpretations, it is merciless in punishing stupidity, and with "nature" ignorance is crime. The punishment is always a signal for a readjustment of what hitherto we have asserted as true.

The progress of science might be described as a series of successes and failures on an ascending curve. No failure means a total collapse of knowledge, no success is ever complete. But the proportion of success to failure is encouraging and allows us to conclude that the outer world of reality is not beyond the measure of our understanding. But if we are not led to skepticism neither are we given absolute certainty. There is no incontrovertible proof that the sequences of nature, of days and nights, or of our own thoughts as we know them, will ever return.

The two main types of mind in the world, the optimistic and pessimistic, will emphasize the one fact or the other, the successes of yesterday, or the uncertainty of to-morrow. Meanwhile science lives by constant readjustment, finding in its growing success and control the hope, no matter how distant it may be, of some ultimate consummation.

G. O. WARREN.

BOSTON. MASS.



## THE ROCK OF AGES.

THE nature of science is much misunderstood even by scientists of rank, and as a result theories such as agnosticism, pluralism, pragmatism, humanism, etc., make their appearance. The truth is that the conception of science as a method, as a systematic plan of investigation, as a consistent principle of arranging facts in order, has not as yet become common property among our main investigators, and there is a notion afloat of the haphazard character of scientific research.

Mrs. Fiske Warren, whose article "A Philosophical Aspect of Science" appears elsewhere in this issue, is an instance of this tendency. She studied four years at Oxford, taking the full philosophical course with teachers representing opposing schools of philosophical thought. She is introduced to us by Professor William James who speaks of her in the highest terms.

Mrs. Fiske Warren's conception of science is by no means isolated. In a lucid way she summarizes and ably represents the view common among many scientists, and from this standpoint it almost appears a kindness toward science, this inadequate mode of research, to look upon its future with indulgence and suppress the pessimism of despair. In spite of the many drawbacks of science, Mrs. Warren advocates a conditional optimism which is to comfort us for the loss of our illusion.

Note that in her conception the progress of science "might be described in a series of successes and failures

on an ascending curve; no failure means a total collapse of knowledge, no success is ever complete." Thus she places scientific solutions on a level with haphazard probabilities, but even in doing this she ignores the fact that the simile here used is based on the conception of a mathematical curve which would definitely predetermine the progress of science. The development of science is no less subject to law than the growth of animals and plants, the crystallizations of minerals, yea, the formation of whole solar systems. This does not prove as yet, but indicates, that science is not comparable to any haphazard mode of hitting the bull's eye and does not depend on incidental successes, harboring the failures also in its own nature as if they were part and parcel of science itself and did not belong to the struggles of poor mortal and fallible scientists who fail to attain an insight into her nature.

When Mrs. Fiske Warren calls her position "a philosophical conception of science," I must demur, for I hold that her views are unphilosophical and even antiphilosophical; they are pluralistic. Philosophy has always endeavored to trace the unity of our conception of the world, and a pluralistic philosophy which, while clinging to particulars and to individual facts, denies unity and scorns system as pure theory is practically a surrender of the ideal of philosophical thought and implies, to say the least, a suggestion that science is impossible and that the light of science is a mere will-o'-the-wisp.

#### METHOD THE ESSENTIAL FEATURE OF SCIENCE.

Science is a method of inquiry and as such it means system. The results of science are systematically formulated universalities, i. e., groups of facts of the same character described in their essential nature, singling out the determinant features and omitting all the rest. Such a formula describing a definite set of facts is called a natural

law, and I will say here incidentally that what Mrs. Warren says concerning the nature of abstraction is quite correct, although she might have better characterized the nature of abstraction if she had borne in mind the significance of the formal sciences, especially logic and mathematics, which play such an important part in abstraction, furnishing the backbone of what we call system in science.

We feel prompted to make a few further comments on the importance of abstraction, for he who truly understands the nature of abstraction can no longer cling to a pluralistic conception either in science or philosophy.

Abstraction singles out some definite features and drops all others. An abstraction is mind-made but it represents a real quality of objective things. People who speak of "empty abstractions" with a view of detracting from their significance know not what they say and only exhibit their own lack of judgment. Abstraction is the scepter with which man rules nature, for by the means of abstraction we recognize the common features of things, classify them as general concepts, and learn to formulate the uniformities of nature, commonly called "natural laws."

The very existence of abstraction proves that generalization is possible and the mere possibility of generalization is an evidence that there are general types, and reason is justified in trusting to logic, arithmetic and mathematics when dealing with facts of the objective world.

Man is the only living being on earth who can make abstractions, for the organ needed to think of whiteness and not of white snow or other white things, to conceive of numbers by counting things and omitting all qualities of the things counted except their presence as items, presupposes the use of words which serve as spoken symbols for things or their qualities and the faculty of making abstractions, of comprising many sense-impressions into general concepts, and of classifying them into a system of

genera and species, is called reason. The speaking animal becomes a rational animal and the rational animal alone can form abstractions, while a methodical use of abstractions establishes science.

A formula describing a definite set of facts is a scientific acquisition which (notwithstanding Mrs. Warren's statement to the contrary) is a success, complete in its special field. The three Kepler laws, for instance, are a definite and complete solution of the problem of the movements of heavenly bodies. While it is true that the attempts to interpret these facts of nature were failures, of which many were by no means a "total collapse of knowledge," it would be a great mistake to imagine that Kepler had only succeeded in a limited way, and that we had to wait for further facts in order to verify his three laws, or even to expect them to be upset or at least modified by our increase of knowledge.

Science is not a collection of more or less verified hypotheses. It is not an aggregate of mere probabilities. Science is a method of determining the truth, and in spite of the many gaps in our comprehension it offers us a well guaranteed fund of knowledge.

It is characteristic of a conception of science such as underlies Mrs. Fiske Warren's presentation of the case that no distinction is made between theory and well ascertained knowledge of facts. Note the instances which our author adduces to prove her case. She selects for the purpose a brief review of the vicissitudes of the history of matter, a problem which even to-day is not yet ripe for solution. She presents to us a number of hypotheses, not to say vagaries, of prominent scientists.

#### THEORIES AND TRUTHS.

Newton formulated the law of gravitation in his *Principia*, and this is Newton's immortal work, but otherwise

his significance as a scientist is greatly overrated. Bear in mind Schopenhauer's strictures<sup>1</sup> that Newton's fame is based on the statement of a theory which was first pronounced by Hooke, whose claim in this case he ignored with persistent narrowness.<sup>2</sup> Note Newton's childish ideas concerning the meaning of the Revelation of St. John, his exaggerated high opinion of these his theological views, and you will understand that his notions concerning the ultimate constitution of matter cannot be treated seriously as possessing any scientific value. They are theories based upon insufficient data, or we might almost say on pure imagination. Though Newton's *Principia* is of great importance as a definite formulation of the solution of a problem which had been matured in his time, to present his views of matter as a contribution to science is quite misleading.

When Lord Kelvin visited America he was interviewed by a sage newspaper reporter who wanted an authoritative statement concerning his view of the vortex theory, and Lord Kelvin who had probably been often bored by similar requests simply answered, "It is a mere theory," and so the reporter indulged in extravagant language as to the modesty of the English scientist who spoke of his most famous discovery as a mere hypothesis. The truth is that it was a mere hypothesis, for it is not yet a formula covering facts. It is the attempt to explain certain facts for which we have not yet enough data. That Lord Kelvin's theory is not only ingenious, but that it is very helpful, is conceded by all who utilize his suggestion as a working

<sup>1</sup> *Welt a. d. V.*, I, 25; II, 58, 86 (2d ed., 88). The dispute anent the priority of the invention of the integral in mathematics might find a true solution in the proposition that the first idea came from Leibnitz's fertile brain, to whom it was suggested by his monadology, the theory of infinitesimal particles, while Newton appears to have applied it to the computation of gravitating bodies and thus reduced it to exact mathematical concepts. Dühring in his *Kritische Geschichte der Philosophie*, pp. 353, is inclined to side with Newton against Leibnitz.

<sup>2</sup> See *Enc. Brit.*, s. v. "Newton," XVII, 440 ff.

hypothesis and to speak of it as "moribund," creates the suspicion that Mrs. Warren has not grasped its real significance.

There is a difference between theory and truth which is this: A theory is a tentative statement of a truth; it is a working hypothesis, temporarily made and awaiting verification, while a truth is a description of a certain set of features or of an interrelation of phenomena which covers the entire range of facts.

#### THE LAW OF CAUSATION.

As an important misconception we will mention Mrs. Fiske Warren's interpretation of causality. She speaks of "the law of causality" as "gradually being excluded from science, which more and more contents itself with description." She says, "it still has a respectable reputation. But is it an accurate law? What it asserts is this: Reproduce all the conditions of a certain phenomenon, that phenomenon will reappear." It would lead too far to here renew the discussion of the law of causality. I will only refer to former expositions of mine, especially in discussions with Professor Ernst Mach.<sup>3</sup>

The law of causation has not been replaced by description. It has always been description, except that the term "description" was not introduced until Kirchhoff defined mechanics as an exhaustive and concise description of motion. What Kirchhoff eliminates is the notion of metaphysical factors behind motion, which have sometimes been dignified with the name "cause," but the scholars who used this metaphysical name "cause" did not mean cause at all; they meant "reason," and their notion of reason was based on a distorted view of natural law which then

<sup>3</sup> *The Sord of Metaphysics*, pp. 119-130. Cf. "Mach's Philosophy," *Monist*, XVI, 350-352. See also *Fundamental Problems*, 79-109; and *Primer of Philosophy*, 137-172. For a treatment of the Hume-Kantian problem of causation, see *Kant's Prolegomena*, especially pp. 198 ff.

was not conceived as a uniformity but as a metaphysical entity behind phenomena.

In former discussions of the problem of causation I have pointed out that "a cause" is always a motion, an event, an occurrence, which in a system of conditions changes the arrangement, and results in a new state of things commonly called "the effect." Accordingly the law of cause and effect is the law of transformation. It describes a series of successive changes, the start of which in the system of our investigation we call "a cause," the end "an effect"; and it goes without saying that the effect in its turn may again be a cause, and we thus have a succession of changes which represent causes and effects in an interlinked concatenation.

Without going into further details, I will only say that Hume's famous investigations of causation have missed the mark in so far as he defined cause and effect as "objects following each other," instead of treating them as two phases of one and the same process; thus he could not understand the necessary connection between strychnine and the dead mouse.

After all, the law of causation is not being excluded from science. It is nothing more nor less than another aspect of the famous law of the conservation of matter and energy.

Speaking of the law of the conservation of matter we must bear in mind that matter is to be used in the more general sense of substance, not in its limited definition of mass and volume; for certain facts, now well established, teach us to look upon ponderable matter as subject to origin and destruction. We have reasons to assume that new matter originates in some nebulae of the starry heavens, in due succession of the Mendeljeff series, according to their atomic weight, while the discovery of radium suggests a final dissolubility of chemical atoms. The new view does



not upset the law of conservation of substance, for we assume that the elements thus formed in the celestial retorts of nebulas are due to a condensation of the ether, or whatever name we may give to the primordial world-stuff.

#### POINTS OF REFERENCE.

If the law of causation were really what Mrs. Fiske Warren says it is, viz., "Reproduce all conditions of a certain phenomenon, that phenomenon will reappear," it would be useless even as a working hypothesis; for, as Mrs. Warren truly explains, we can never reproduce the very same conditions the second time, and this she proclaims in the most exaggerated terms in spite of her former explanation of the significance of abstraction. Our method of science consists in eliminating all accidentals and confining the attention to essential features. In order to prove her case she, following the example of Poincaré, points out some accidental features and thus shows that the repetition of the same event is impossible.

Poincaré here makes the same mistake into which Herbert Spencer falls in his *First Principles*, where he attempts to prove that the simplest phenomena of motion are unknowable. He succeeds only by a blunder. He omits the first essential condition of describing a motion,—he leaves out a point of reference. If a captain walks on deck of his ship, from east to west and the ship is moving in the opposite direction at the same rate, is he moving or standing still? This conundrum is produced only by muddling up the issues and projecting our own confusion into the world of objective facts. If I promise to return to the Pantheon in Paris on a certain day and hour, I mean that place with reference to our geography and not the very same spot in the solar system or even the stellar universe. The very definition of the hour and day implies incidentally



a changed position of the earth with reference to the sun, and the identity of the spot is determined by the accepted meaning of language; the introduction of astronomical relations would be mere quibbling.

#### THE STABILITY OF TRUTH.

In conclusion I will say: It is not true that "over and over again the fundamental 'truths' have been superseded and buried under fresh growth." The real truths of science, the uniformities of nature, are descriptions of the essential features of certain sets of facts, methodically systematized. They are never superseded, but each of them constitutes a *κτῆμα ἐς αἰεί*, a possession that has come to stay, and which will be useful as a foundation for further inquiry.<sup>4</sup>

The reason why there is a lack of appreciation of the systematic nature of science, is most likely due to a lack of philosophic training, which in its turn is due to the prevalence of metaphysical and other faulty philosophies such as are sometimes taught even in the foremost and most renowned universities. In order to understand the systematic character of science we must learn to appreciate the paramount significance of form and formal thought, for here lies the real problem of the foundation of science.

The formal sciences give us a key to nature; they enable us to construct systems of reference which can be utilized for describing events under observation in terms of measuring and counting, or, generally speaking, by a description of their formal relations. The formal element in thought as well as in objective reality is the connecting link that overbridges the chasm between subject and ob-

<sup>4</sup> A summary of the author's view is stated very briefly in the introduction to the little book *Philosophy as a Science*, published by the Open Court Publishing Company.

ject and which furnishes us with the key by which we may scientifically comprehend nature.

The view here presented appears to me as the only tenable interpretation of the nature of science. Neither the extreme empiricists nor the Kantian school have offered a satisfactory solution. The empiricists who are at present in the ascendancy fail to see the systematic nature of science, and the Kantian school had the misfortune of finding a wrong expounder to the English speaking world in the philosopher Hamilton. His misconstruction of the Kantian *a priori* changed the Kantian school in England into a metaphysical philosophy involving some inferences which were quite foreign to Kant himself.

The empiricists on the other hand, having a wrong conception of Kant's *a priori*, lost the truth of his philosophy, and instead of understanding the nature of certitude, of consistency, of a systematic method, they produced a kind of evidence by accumulation of details, thereby missing the essential and characteristic point of science. The only foundation of science is to be sought in a philosophy of pure form.

#### SYSTEM THE AIM OF SCIENCE.

System is the backbone of science, and system is the result of the formal sciences. The latter have been gained through abstraction and constitute what is commonly called "reason." The purely formal aspect of things makes it possible to create purely formal systems of thought such as arithmetic, geometry, and logic. They are *a priori* in the Kantian sense. They are subjective or purely mental, but serve as models for any object of investigation, be it purely imaginary or actual, merely possible, potential or real, and thus they can be used as means of reference for describing any existence, real or imaginary, which is dominated by consistency. Consistency in the realm of the

purely formal sciences produces that wonderful harmony which we observe for instance in mathematics. Consistency in nature produces what in a former article we have called lawdom,<sup>3</sup> a state of things called in German *Gesetzmässigkeit*, which makes it possible for certain facts of the same class to be described as uniformities. Consistency in action renders possible the rationality of living creatures, enabling them to exercise choice, to make plans, and carry out purposes.

Though many scientists look upon science, in the light of Hume's skepticism, as the result of good chances, of mere lucky haphazard successes, there is developing in the present age a deeply rooted confidence that science is more than the result of accidental guesses, and we believe that we have produced the evidence of the attainment of scientific certitude, the foundation of which is laid in the philosophy of form.

But this confidence is of a broader nature and of a more ancient date than is commonly granted. This same confidence has accompanied man from the dawn of his rationality and has found expression in his religion. The world was never a chaos to man, but always the law-ordained cosmos, and this feature of cosmic order was pictured in man's religion as a belief in a divinity of some kind, mostly as a hierarchy of gods, and, in the theistic stage of religious development, simply as God.

Religion accordingly appears in this conception as an instinctive formulation of a trust in the world-order, and this world-order, which the philosophy of form has been able to trace, constitutes the bed-rock of all our thoughts and aspirations in religion as well as in science. In this sense we can truly say that here lies the Rock of Ages.

EDITOR.

<sup>3</sup> See *The Monist*, XX, p. 36.

## THE PSYCHOLOGICAL BASIS OF RELIGION.

**I**N the discussions of religion, whether technical or popular, one frequently comes upon expressions such as the religious nature of man, the religious sense, the religious impulse, the religious instinct. But upon careful analysis, it is exceedingly difficult to discover that any of these expressions are used with precision or consistency. In this respect the professional psychologists are scarcely more satisfactory than the theologians. The tendency, however, of the psychologists is to establish a definition of terms which simplifies the task of determining whether religion is to be described by these terms. For example, it is clear that religion cannot be ascribed to any unique faculty for the simple reason that modern psychology does not recognize the existence of unique faculties of any kind. Neither can it be called a "sense," for the term sense is limited to those organic functions which are known as the sense of sight, hearing, pressure, temperature, and the rest. In the same way the words impulse and instinct are gradually attaining a specific usage which in the nature of the case precludes their application to religion. Both impulse and instinct are employed more and more to signify motor reactions; impulse indicating the dynamic, spontaneous character of an act, and instinct referring also to the organization of movements in the attainment of definite ends or in manifesting characteristic attitudes, such as fear. Thus the random movements of the infant express impulses, but grasping and sucking are usually classed as instincts. Certainly religion is not a motor reaction of this type.

The phrase religious consciousness seems more promising, but this is largely because the word consciousness is inclusive enough and sufficiently flexible to escape the objections made against the other terms. Whatever else religion may be, it is some form of consciousness. This is the most general term which psychology employs, and therefore to speak of the religious consciousness puts the whole burden back upon the adjective religious, and we scarcely get nearer a solution of the problem than before, except that we have a designation for our subject which is not beset by conflicting or confusing usage. The question is then, What is the psychological basis and nature of the religious consciousness?

It may add force to the question to recall that for functional psychology there is an indefinite variety of types of consciousness—art consciousness, scientific consciousness, civic consciousness, masculine consciousness, feminine consciousness, race consciousness, class consciousness. Each profession, trade, locality, family, or other group having common interests tends to develop a consciousness in which every member shares more or less keenly. One feels the reality and force of these different kinds of consciousness as one converses with men who possess them, men of different professions and persons from different sections of the country. Or, again, one immediately experiences for himself the contrasted mental attitudes and psychical functions when, in the course of the day, he goes from his study to the dining-room, to the tennis court, to the business street, to the hospital, to the concert, to the place of worship. All these forms of consciousness are definite and describable, and one is as real and as tangible as another. They are manifestations of interests, of habits, of customs. We never doubt their reality as genuine experiences, and we do not question that activities which we only observe, without actively sharing,

involve definite forms of consciousness for those engaged in them. Because I do not play golf, I cannot deny that there is such a thing as golf consciousness in those I observe pounding the white balls over the green turf on a torrid day or eagerly discussing at dinner the drives and fozzles of their afternoon sport. This golf consciousness is something in its own right. It is different from tennis consciousness or bridge consciousness. It develops its own social institutions, its heroes, its literature, its code of etiquette, its advocates, its apologists, and its fanatics. Taken in some such objective way, the religious consciousness is obviously a tremendous reality in all races and peoples. It is represented everywhere by ceremonials, temples, sacred places, priests, traditions, saints and sages.

The definitions of this religious consciousness are notoriously various and partial. They represent special phases or stages of religious experience. In intellectual terms it is identified with the belief in spirits, in the supernatural, in the infinite; in terms of feeling, it is an emotion, the feeling of dependence, the feeling of fear; in terms of the will it is a set of desires and of organized habits. This diversity, representing different philosophical and temperamental standpoints, has led Höffding to assert that the definition of religion is largely a matter of taste.

The statement offered here is, therefore, presented only as a working suggestion to indicate at once the general point of view and something of the scope of the religious consciousness. First, religion, or the religious consciousness, expresses man's craving for life and attaches supreme importance to those objects and activities upon which the maintenance and furtherance of his life depend; second, the religious consciousness is social in its nature, involving the welfare of the group and enveloping the mind and will of the individual in a body of inherited custom. The elaboration of these two propositions will show

more fully what they signify. It will be convenient to draw illustrations from primitive as well as developed forms of religion. Use is made of primitive religions in this connection because in them the phenomena are simpler and are less complicated by the overgrowths and divergent interests of civilization. Besides, the evolution of the higher types of religion from these earlier stages is so obvious to the student of the history of society that he sees in the general structure and framework of primitive religion the main features of the later growths.

Take, then, the first proposition that the religious consciousness expresses man's craving for life and attaches supreme importance to those objects and activities upon which the maintenance and furtherance of his life are felt to depend. The most casual observer of religious phenomena must be impressed with the fact that religion takes itself with the utmost seriousness. It regards its practices and customs as matters involving the very sources and conditions of life. Throughout the Bible, which in this respect expresses the keynote of religion everywhere, the assurance is that those who do the things enjoined shall live and prosper, while those who refuse or neglect to do them shall surely die.

After the law of the ten commandments the injunction is added: "Ye shall walk in all the way which the Lord your God hath commanded you, that ye may live, and that it may be well with you, and that ye may prolong your days in the land which ye shall possess. Hear therefore, O Israel, and observe to do it; that it may be well with thee, and that ye may increase mightily, as the Lord, the God of thy fathers, hath promised unto thee, in a land flowing with milk and honey." There are also many passages like the following: "Trust in the Lord, and do good; so shalt thou dwell in the land, and verily thou shalt be fed. Delight thy-



self also in the Lord; and he shall give thee the desires of thine heart."

Religion is thus an expression of the most elemental demand of the human **being**—the demand for existence, for welfare, for success. It exalts those functions, habits, objects, and customs which are felt to further life and warns against whatever threatens it. Religion is identical with the central biological impulse; with the will to live, to affirm, to grow. It is natural, therefore, that the basal instincts of human nature should be conspicuous and controlling factors in religion, and the evidence is abundant that this is the case. This is particularly clear in primitive races where the fundamental instinctive reactions are preserved in the ceremonials without qualification or apology. The instinctive reactions are those involved in preserving, perpetuating, and protecting life. They are the instincts of getting food, of reproduction, and of resisting and escaping danger.

The ceremonials are in large part the reproduction of actions and situations experienced in the actual life of food getting, courtship and war. If a people has totems, those totems are the familiar animals and plants of the environment. They are or have been the staples of food, of subsistence. The totems of Australia and of North America are the commonplace necessities of life in those countries. And the ceremonial of the totem, whether of fish or flower, consists of dancing and mimetic movements typical of the habits of the species. The leader usually wears a head gear and his body is painted to make him resemble the totem.

Spencer and Gillen give the following description of the initiation ceremony of the eagle-hawk totem in Central Australia. It was performed by two men, supposed to be two eagle-hawks quarreling over a piece of flesh, represented by the downy mass in one man's mouth. "At first



they remained squatting on their shields, moving their arms up and down, and continuing this action which was supposed to represent the flapping of wings, they jumped off the shields and with their bodies bent up and arms extended and flapping, began circling round each other as if each were afraid of coming to close quarters. Then they stopped and moved a step or two at a time, first to one side and then to the other, until finally they came to close quarters and began fighting with their heads for the possession of the piece of meat. This went on for some time, and then two men stepped out from amongst the audience and took away the Churinga (sacred sticks used in the head dress) which were a great weight and must have caused a considerable strain on the head, especially in the great heat of the afternoon sun, for it must be remembered that it was now well on into the summer. Then once more they began going round and round each other flapping wings, jumping up and falling back just like fighting birds, until finally they again came to close quarters, and the attacking man at length seized with his teeth the piece of meat and wrenched it out of the other man's mouth."<sup>1</sup>

The ceremony of the plum-tree totem was acted by four men in the following way. "First of all one man came up to where the audience was sitting by the *Parra* (a mound of earth). He pretended to knock plums down and to eat them, and after a short time he sat down amongst the audience. Then two others came up, one of whom remained standing, while he knocked down imaginary plums, which were eaten by the other man, who seated himself on the ground. This over, both of the men went and joined the audience, and the fourth man came and went through the same pretence of knocking down and eating plums."<sup>2</sup>

<sup>1</sup> Spencer and Gillen: *The Native Tribes of Central Australia*, p. 296.

<sup>2</sup> Spencer and Gillen, *Ibid.*, p. 320.

The ceremonials of all peoples are of this general type: they reflect the occupations, the life struggles and the central satisfactions of mankind. Rice is the staff of life to the Malays, and their rites are replicas of the habits developed in its cultivation and use. The Eskimos live largely by seal and fish, and the activities involved in their capture and use are models of their rituals. In similar ways, the planting, harvesting and preparation of the maize by the American Indians, the digging of yams by the West Africans, the use of the date palm by the Arabs, determine the forms of their religious celebrations. Every great interest of a people is reflected in its religion, and where the religion is indigenous and uncorrupted, no extraneous elements enter. "There are no tiger-gods where there are no tigers," and no rice-gods where there is no rice. Mingling of races, conquest and decadence may obscure this basic fact, but in undisturbed native peoples the general principle is clear. Even in mixed and migratory tribes the persistence of the framework of old rites and myths gives it confirmation.

The Todas, a small tribe in the Nilgiri Hills of southern India, furnish a striking illustration of the economic determination of religion.

"The milking and churning operations of the dairy form the basis of the greater part of the religious ritual of the Todas. The lives of the people are largely devoted to their buffaloes, and the care of certain of these animals, regarded as more sacred than the rest, is associated with much ceremonial. The sacred animals are attended by men especially set apart who form the Toda priesthood, and the milk of the sacred animals is churned in dairies which may be regarded as the Toda temples and are so regarded by the people themselves. The ordinary operations of the dairy have become a religious ritual and cere-

monies of a religious character accompany nearly every important incident in the lives of the buffaloes."<sup>3</sup>

The Semites were originally nomadic, and this accounts for the conspicuous place which animals hold throughout their religion. "The main lines of sacrificial worship were fixed before any part of the Semitic stock had learned agriculture and adopted cereal food as its ordinary diet." Therefore cereals and fruits never had more than a secondary place in Semitic ritual, but those which were most conspicuous in religious ceremonies, "were also the chief vegetable constituents of man's daily food," namely, meal, wine, and oil.<sup>4</sup>

The instincts centering in the sexual life are in certain respects more focal and dominant in religion than those of food. In these instincts the life of the species is involved. The individual asserts here a will greater than his own. The supreme demand of nature is for the new generation. Throughout the whole scale of life the event safeguarded by the most urgent impulses is that of procreation. When that is accomplished, the parent is of value only in protecting and nurturing the young. Nature demands every risk, every effort to effect the creation and to provide for the welfare of the new generation. Religion, as the deepest and most comprehensive expression of the will to live, is therefore an embodiment, in more or less direct and obvious ways, of the sexual instinct. One of the immediate, objective proofs of this is the fact that the crises of the sexual life are among the most conspicuous occasions of religious ceremonials. These occur at puberty, at marriage, and at childbirth. In primitive races, at puberty, when the sexual instinct appears, the youth is started through the long and trying initiation rites which are not complete until he is a member of the tribe. Again, at the

<sup>3</sup> W. H. R. Rivers, *The Todas*, p. 38.

<sup>4</sup> W. Robertson Smith, *The Religion of the Semites*, pp. 219, 222. Cf. Barton, *Sketch of Semitic Origins*, Chapter VII, "Yahwe."

time of marriage, elaborate ceremonies are observed to remove the taboos between the sexes, and to insure the fruitfulness of the union. The bride and groom are accompanied by processions to ward off evil influences. Nuts, flour or rice may be thrown upon them. Various means of concealment are employed to thwart the evil eye. For this, disguises and veils are employed, and in many countries, the bridegroom never sees the bride until the marriage is consummated. Obligatory customs are also universal with reference to childbirth. The newborn child and the mother are taboo and are secluded from the camp until a period of time has elapsed during which the prescribed observances must be faithfully kept. One scarcely needs to refer to the perversions and exaggerations of this sex principle which have often characterized religious customs. The extent of Phallic worship and sacred harlotry are, however, evidences of the fact that religion has been liable to abnormal developments through elements native to it.

In these two respects, then, religion shows itself to be the manifestation of the affirmation and consecration of life: the chief objects of food and the activities concerned with them are sacred and so also are the organs and the functions of sex.

The second proposition is that the religious consciousness is social in its nature and concerns the welfare of the group. Here, again, the fact is clearly illustrated in primitive peoples. Their solidarity within the tribal group is well understood. It was not a consciously attained and rationally sustained social life, but it was so real that every important concern was an affair of the group. So close and so literal was this tribal organism that the whole of it was involved in the deeds of every individual. This is familiarly illustrated by the law of blood revenge, by which the whole tribe was held responsible for the misdeeds of any member. Dudley Kidd characterizes this solidarity

among the Kafirs as follows: "A Kafir feels that the 'frame that binds him in' extends to the clan. The sense of solidarity of the family in Europe is thin and feeble compared to the full-blooded sense of corporate union of the Kafir clan. The claims of the clan entirely swamp the rights of the individual. The system of tribal solidarity, which has worked so well in its smoothness that it might satisfy the utmost dreams of the socialist, is a standing proof of the sense of corporate union of the clan. In olden days a man did not have any feeling of personal injury when a chief made him work for white men and then told him to give all or nearly all, of his wages to his chief; the money was kept within the clan, and what was the good of the clan was the good of the individual and *vice versa*."

Religion is the supreme expression of this social consciousness. All of its ceremonials are corporate in character, being conducted either by the group as a whole or by publicly recognized leaders. These ceremonials are social also in a deeper sense than being the possession of all the existing members of the tribe. They have an immemorial history and are felt to be shared by the ancestors as well as by the living. They are therefore in the highest degree inviolable. The welfare and efficiency of the tribe are bound up with the scrupulous and reverent observance of the ancient rites. The individual who participates in them does not dare to speak of them or to employ their myths and prayers except in the manner and on the occasions which the group customs allow. The things with which the religious ceremonials deal are, as we have seen, the things of common concern, such as the food supply, the regulation of marriage and the care of children, the conduct of war, protection against disease, and unusual natural events like floods and drought. An interesting evidence of the social character of religion is seen in the fact that the recognized deities are those spirits which are identified

with an organized human group. William Robertson Smith points out that "the difference between gods and demons among primitive Semitic peoples lies not in their nature and power, . . . but in their relations to man. The jinn would make very passable gods, if they only had a circle of human dependents and worshipers; and conversely a god who loses his worshipers falls back into the ranks of the demons, as a being of vague and indeterminate powers, who having no fixed personal relations to men, is on the whole to be regarded as an enemy" (p. 121). The same relation is seen in other stages of development. For example, the great gods embody the qualities of character which have been most completely established in the common social experience. The lesser gods represent local or intermittent, partially organized interests of the common mind.

On the inner psychological side this social character of the religious consciousness is identical with the neighborly sympathetic attitude. It springs up quite naturally in any group which has common experiences and whose members are mutually dependent. It has its most original and primary development in the family. Now the inmost bond of the family life is that which exists between the mother and the child. It is this which has given stability and consistency to the family and resulted in the permanence of the relation between the parents. Instead of the care of the child resulting from the permanence of relations between parents, it is probable that the parents were held together by the care of the child. It was originally the conditions under which woman was compelled to live while caring for the child which made her peculiarly the center of the social attitude and enabled her to foster and radiate the social atmosphere. On this account early society grew up around the mother and the child. This is shown in the fact that descent is first reckoned in the

female line. The children belong to the mother's family and not to the father's. The husband gave up his own people and went to live with the family of the bride. More than this, woman became through her settled life the creator and owner of property. In this way she exerted control over the social situation, and the feminine quality of sympathy and love became the chief element of the constructive social consciousness.

This social consciousness is, after all, the organizing, controlling power in human life. It maintains its continuity through successive generations. It molds all docile individuals to its will, and crushes or excludes those who will not conform. The newborn child is submitted to its authority and is closely held within its prescribed customs through life. It has the force of external law and of final authority. This will of the group is objectified in agents regarded as over and above the group itself. They embody the sacredness, permanence and legislative sanctions of the abiding social consciousness. This common consciousness, expressed in vivid sensuous symbols, it may be, of totem animals, or of great personalities, and in dramatic ceremonies, is constantly renewed and strengthened in the most vital experiences of the group. All of the interests and values of life are felt to center in the tribal symbols, the ceremonial observances. All the arts of speech, music, personal decoration, and the dance are contributing elements in the ceremonial. There is no art or knowledge, law or labor, known to the age which is not comprehended in the religious observances. In primitive peoples none of these interests exists independently. Life is of one piece and it is religious. It seeks for the great means of life and does so through the one organized will of the group. This social consciousness extends over the most private and seemingly individualistic activities. For example, among the natives of southeast Australia Howitt found that hun-



ters who kill game at a distance from the camp observe the strictest rules with reference to the distribution of the parts of the animal. Different regulations exist for different game, but all of them are minute and specific like the following rules for distributing the native bear: "Self, left ribs; father, right hind leg; mother, left hind leg; elder brother, right forearm; younger brother, left forearm. The elder sister gets the backbone, and the younger, the liver. The right ribs are given to the father's brother; a piece of the flank to the hunter's mother's brother; and the head goes to the young men's camp."

The religions of civilized peoples like those of primitive peoples have preserved the same general biological and social character. Their energizing impulses are those of the natural instinctive tendencies to maintain life, but with greater elaboration and idealization. In the teaching of Jesus it is assumed that the faithful will have their necessities providentially provided. Food and raiment are among the things conceived as fundamental in the demands of religion, and one must have faith in securing them, without worry or anxious care. The petition for the coming of the kingdom in the great prayer of Christendom is followed by the prayer for daily bread. Religion never gets away from this primal necessity, though it does take it up into an idealized and extended usage. It seeks the bread of life in the fullest sense. Food and drink are the materials of the communion service. This pervasive imagery drawn from the most elemental experiences of the natural man is unmistakable. The water of life, the fountain of life, the river of life, the tree of life are yet the most suggestive terms concerning even the highest needs of our human nature. What will a man give in exchange for his life? is the challenging cry. It is notable that the modern as well as the ancient religious consciousness is brought to sharp definition in great crises of famine, flood, pesti-



lence, and war in which the very existence of the people is endangered.

But it may not be so easily admitted that the reproductive instinct is vital in the religious consciousness. Here, however, there is much evidence of the objective kind embodied in our customs. Our religious practices, like those of earlier stages, are particularly in evidence at marriage, at childbirth, and at the time of puberty when the youth are confirmed or otherwise initiated into the group. The profound interest which the Christian community takes in children is an expression, however unconsciously it may be so, of the reproductive instinct.

The direct evidence, however, for considering the sex instinct basal in religion is the fact that the religious consciousness is attained naturally and simultaneously with the maturing of that instinct, and that certain of its manifestations appear directly and in a decisive manner at the heart of religious experience and religious customs.

That adolescence is the period in which religion becomes vital to the individual, all students of the subject agree. The results of the detailed investigations of thousands of cases by Starbuck, Coe and Hall confirm this. The universal practice of the liturgical churches in receiving youth as full members at this period is impressive evidence that this is the natural and normal time of religious awakening. The practice of the natural races in initiating their children at this epoch adds world-wide and world-old usage in support of the close relation of this instinct to the social attitude so characteristic of all religion.

Not only is adolescence the time when the reproductive instinct and religion develop in the individual, but there is evidence that religion arises in and through the maturing of the instinct taken in its full significance. Up to this time the individual is self-centered, and possesses little spontaneous or deep interest in other persons. His attitude

toward organized institutions and groups of people, even his own family, is characteristically external, formal, and fragmentary. But now he takes an interest in others, becomes affectionate, sensitive and sympathetic. The urgency, range, and reconstructive power of these attitudes cannot be accounted for by any instruction the youth receives. They are in fact quite independent of instruction and occur without it. The only explanation of the strength of these new interests is that they have an instinctive basis much deeper than the conscious will or intent of the individual. The transformation of adolescence is from an individualistic to a social life and the new psychological quality displayed is that of sensitiveness to the opinion of others—a sensitiveness which is most direct and characteristic with reference to the opinion of the opposite sex.

G. Stanley Hall has recounted in detail the development of adolescent self-consciousness in reference to the opinion of others. "The boy suddenly realizes that his shoes are not blacked, or his coat is worn and dirty, his hair unbrushed, his collar, necktie, or cap not of the latest pattern, while girls love to flaunt new fashions and color combinations and have a new sense for the toilet." Manners also afford opportunity for expression of the new self-consciousness and means of bidding for good opinion. There is pleasure in playing rôles, assuming poses, cultivating moods, modifying one's speech, in pronunciation, choice of words, and often in imitation of the vocabulary of favorite companions or teachers. Athletic feats, pride in physical development, trials of strength and absorbing interest in their 'records' characterize boys in this epoch. The emotions of anger, fear, and pity are intensified and relate to a much wider range of experiences, particularly to those of personal relations.

The youth in his teens is sensitive to the approval and disapproval of his companions to a degree which exceeds

any sensitivity due to reflection or to custom. Nothing but the operation of powerful instincts is sufficient to explain it, and that which distinguishes this period of youth preeminently is the appearance of the sex-instinct. With the ripening of this instinct, sensitivity to the opinion of others reaches its height. The normal individual is profoundly moved by his regard for the opinion of his set, that is, by the public opinion of his group. The seemingly heartless egoistic impulses of earlier years are restrained and tempered by eagerness to win favor and respect and by concern for the comfort and welfare of another. It is in the warmth and passion of this maturing instinct that the disposition of affection, social cooperation and genuine altruism develop. As at no previous time the individual feels an imperative, consuming passion to devote himself to another to the limit of his powers. No labor, danger, or sacrifice is too great to win the one he loves. This phenomenon affords endless material for poetry, fiction, and art. On the side of the difficulties encountered, jealousies engendered, and disappointments suffered, it is the theme of the drama and tragedy. In the common experience of average individuals, no other interest surpasses that which lovers feel in each other; and all people instinctively share this feeling with an intensity which permits no doubt that here is reenacted the most important event in the history of the individual and the race. It is through this affection and respect for the opposite sex that the whole complex system of social ends and institutions establishes its strongest hold upon the individual. Through it the individual is socialized and becomes identified with the welfare of others by his own inmost desire. In this way the home is established. To maintain the home, the shop and various industries exist. Schools are organized for the training of the children, and the state springs up in the coordination and control of all these interdependent interests. One is

thus placed in the midst of the vast social order of the material and ideal activities of mankind. His life is thereby disciplined, moralized and spiritualized.

It is this regard for the opinion of others which makes one amenable to the customs of society and brings one into relation and cooperation with the conventions, fashions, duties and ideals of society. Without this susceptibility to the opinions and example of others a person is lacking in the essential quality of sociability. He is unresponsive to class restraints and stimuli, and shares to a degree the irresponsible and antisocial attitude of the criminal. The sexual instinct, normally operative, radiates this sympathetic, unifying disposition and produces groups characterized by intimate association and mutual support. It is the foundation of the notable gregariousness of mankind. As it gives rise to larger groups, it becomes idealized in the relations of blood brotherhood among savages and in the societies of fellowship and practical endeavor among civilized peoples.

The influence of the sexual instinct in developed social groups is further seen in the fact that these groups continue to employ the technique of the sexual life. They appeal to the individual much after the method of courtship, and he is moved to respond by similar reactions. When the nation seeks volunteer recruits for its army and navy, it displays before the youth attractive pictures of military life, of uniforms, brilliant regiments, exploits of adventure and travel. Even the suggestion of danger on the battlefield is a claim upon the valor and gallantry which the republic, symbolized by a female figure, demands of her lovers among brave youth. The same technique of display, invitation, coyness, and modesty appears upon a vast scale when one nation visits another with a fleet of ships or entertains her visitors at a magnificent "world's exposi-

tion." The etiquette of nations is built upon the manners of my lady's drawing room.

The type of social adjustment characteristic of the sexes is still more obvious in religious groups and in the means used by such groups to win the devotion of individuals. Among the members of a religious body there exist ties of spiritual kinship supported by the strongest sentiments. Conspicuous in the phraseology of Christian Churches is that of the family. The Church is the bride of Christ. The members are children of God; brothers and sisters to each other. They are born into this spiritual family, having been conceived by the Holy Spirit. Love is the pervading bond in all these relations. The virtues of Christian character are those which spring from love: sympathy, patience, forgiveness, fidelity, self-sacrifice, charity. The emotional attitudes aroused by the services of the churches are the tender, melting moods in which the will acquiesces in the appeal for love and comradeship.

The derived character of the technique by which religion makes its appeal to the individual is in keeping with the organizing principle of religious groups. Professor Thomas has aptly described this process. "The appeal made during a religious revival to an unconverted person has psychologically some resemblance to the attempt of the male to overcome the hesitancy of the female. In each case the will has to be set aside and strong suggestive means used; and in both cases the appeal is not of the conflict type, but of an intimate, sympathetic and pleading kind. In the effort to make a moral adjustment it consequently turns out that a technique is used which was derived originally from sexual life, and the use, so to speak, of the sexual machinery for a moral adjustment involves, in some cases, the carrying over into the general process of some sexual manifestations. The emotional form used and the emo-

tional states aroused are not entirely stripped of their sexual content."<sup>5</sup>

This controlling, organizing instinct which emerges with full power in adolescence is accompanied by an awakening of mental life on every side. The senses become more acute; the imagination is developed in new directions, with a scope and energy which often overwhelm the youth in a confusion of aspirations and longings; the will, in the form of urgent ambitions, is roused to resolve upon great enterprises such as patriotic service and social reforms; the intellect is stimulated to great activity, to criticism, analysis, careful reasoning and often to constructive production. It is the period of idealism, the age in which the ends set up for attainment are remote and vast. These ends are also ideal in the sense of being altruistic and disinterested. The same disregard of mere personal comfort or success which leads the youth to give himself with such abandon to win a lady's hand, is shown in devotion to other interests in which his will is once enlisted. The statistics concerning the aspirations of youth show that the tendency to go outside personal knowledge and choose historical and public characters as ideals was greatly augmented at puberty, when also the heroes of philanthropy showed marked gain in prominence.<sup>6</sup> Earl Barnes remarks significantly, "No one can consider the regularity with which local ideals die out and are replaced by world ideals without feeling that he is in the presence of law-abiding forces." Dr. Thurber's replies from thousands of children in New York with reference to what they wanted to do when grown showed that "the desire for character increased throughout, but rapidly after twelve, and the impulse to do good to the world, which had risen slowly from nine, mounted sharply after thirteen." From his survey of many investi-

<sup>5</sup> Thomas: *Sex and Society*, 115 f.

<sup>6</sup> G. S. Hall: *Adolescence*, II, 387. Summarizes studies by Earl Barnes, Thurber, Kline.

gations, G. Stanley Hall concludes that with reference to the choice of ideals during childhood and youth: "Civic virtues certainly rise; material and utilitarian considerations do not seem to rise much, if at all, at adolescence, and in some data decline. Position, fame, honor, and general greatness increase rapidly, but moral qualities rise highest and also fastest just before and near puberty and continue to increase later yet. By these choices both sexes, but girls far most, show increasing admiration of ethical and social qualities."<sup>7</sup>

By reason of instinctive awakening to the larger social interests, and by virtue of greater mental power for forming and following comprehensive ideals, youth is the period for the choice of life-occupations, for the development of patriotism, social reforms and religious enthusiasms. At this age the whole nature is full of energy which creates boundless faith in the possibility of wonderful achievements. Idealism, in the strict sense, that is, vital interest in distant and difficult, even utopian humanitarian enterprises, is natural to this age. There is great enthusiasm for heroes, patriots, and religious leaders. It is the time when youths enlist in the army, when they devote themselves to social service, to foreign missions and to philanthropy and charity.

A general summary of this discussion may be briefly made. There is no single instinct or faculty in human nature to which the religious consciousness can be attributed. It is rather the result of the development and interaction of the primal instincts. Such a development is peculiar to man, although he shares these primal instincts with the lower animals. Man possesses a larger brain and more flexible nervous organism through which he is better able to profit by experience. He has gradually attained through a long and tedious process of trial and error, of

<sup>7</sup>G. Stanley Hall: *Adolescence*, II, 392.



experimentation and reflection, an elaborate equipment of practical wisdom, of tools, inventions and social attitudes in which his native instincts secure an expression and a fulfilment far beyond anything possible for the lower animals. He has substituted for the irregular, uncertain means of securing food in savage life, the settled, dependable processes of agriculture and modern industrialism and business enterprise. He has also discovered the value of cooperative, sympathetic attitudes as contrasted with the clannish, exclusive spirit of earlier stages. Thus the tender, intimate, unifying sentiments are being consciously extended to all human beings without distinction of race or class. There is developing a consciousness within whole nations and within mankind as a world-wide family and brotherhood, the inner, controlling motive of which is the elemental craving for life, but for a life richer and fuller and longer, in which all men everywhere may share. It was in the demands of his group life and in the dramatic ceremonial representations of this corporate life that religion controlled, restrained and elevated the life of primitive man. From the working of this common life sprang his notions of divine beings, and through these notions his ancestral customs and ideals of life were mediated to each generation again. The same psychological process operates to-day increasingly clarified, organized and freed from superstition. Compared with those of early man the supreme ideals of our historic and contemporaneous life are vaster, more attractive, more adjustable to the deep needs of our nature. But whatever the degree of refinement, it is just this elaboration and idealization of the primal instinctive interests and the accompanying sense of supreme values which everywhere constitute the life of religion.

EDWARD SCRIBNER AMES, PH. D.

UNIVERSITY OF CHICAGO.

## THE FOLLOWERS OF JESUS IN THE TALMUD.

### THE FIVE DISCIPLES OF JESUS.

IN the Talmud Sanhedrin 43a we read: "Our Rabbis have taught, Jesus had five disciples — Matthai, Nakkai, Netzer, Buni and Thodah. They brought Matthai (before the judges). He said, 'Must Matthai be killed? For it is written (Ps. xlii. 2): *Matthai* (= when) shall (I) come and appear before God.' They said to him, 'Yes, Matthai must be killed, for it is written (Ps. xli. 5): *Matthai* (= when) shall (he) die and his name perish.' They brought Nakkai. He said to them, 'Must Nakkai be killed? For it is written (Exod. xxiii. 7): The *Naki* (= innocent) and the righteous thou shalt not slay.' They said to him, 'Yes, Nakkai must be killed, for it is written (Ps. x. 8): In secret places doth he slay *Naki* (= the innocent).' They brought Netzer. He said, 'Must Netzer be killed? For it is written (Isa. xi. 1): *Netzer* (= a branch) shall spring up from his roots.' They said to him, 'Yes, Netzer must be killed. For it is written (Isa. xiv. 19): Thou art cast forth out of thy grave like an abominable *Netzer* (= branch).' They brought Buni. He said to them, 'Must Buni be killed? For it is written (Ex. iv. 22): *B'ni* (= my son), my first born Israel.' They said to him, 'Yes, Buni must be killed. For it is written (Ex. iv. 23): Behold, I slay *Bincha* (= thy son) thy first born.' They brought Thodah. He said to them, 'Must Thodah be killed? For it is written (Ps. c. 1): A Psalm for *Thodah* (= thanksgiving).' They

said to him, Yes, Thodah must be killed, for it is written (Ps. l. 23): Whoso sacrificeth *Thodah* (= thanksgiving) honoreth me.'"

No Christian tradition exists which specifies any five out of the Twelve as having met with such a fate. But the fact that the five were called disciples of Jesus implies that they were Christians, not that they were contemporaries of Jesus. It is possible that the story refers to the persecution of Christians under Bar Cocheba, and presents a fantastic account of some incident of that persecution. The fact that the martyrdom of these disciples is described on the same page of the Talmud on which the execution of Jesus at Lud (Lydda) is narrated, shows that it was a Jewish and not a heathenish court which sentenced the disciples. On the other hand this Talmudic passage is one of the many curious examples of the way in which the Scriptures are applied by the rabbis. It is one of the strangest specimens of transparent fiction, and of silly trifling with the words of Scripture.

#### JACOB OF KEPHAR SAMA (SECHANJA).

Besides the five names given above the Talmud also knows of another disciple of Jesus, Jacob of Kephars Sama, who was known for his thaumaturgic power, which no doubt led him to be placed in immediate relation with Jesus, the master of sorcery, and which in his time caused a sensation that was never afterwards to be forgotten. In the Talmud this Jacob comes before us as a performer of miracles and a teacher. For convenience' sake we divide the matter, and treat

##### 1. *Jacob, the Performer of Miracles.*

a. In the Tosephta Hullin II, 22, 23 we read: "The Case of Rabbi El'azar ben Damah, Whom a Serpent Bit.—There came in Jacob, a man of Kephars Sama, to cure him

in the name of Jeshua ben Pandira, but Rabbi Ishmael did not allow it. He said, 'Thou art not permitted, Ben Damah.' He said, 'I will bring thee a proof that he may heal me.' But he had not finished bringing a proof when he died. Rabbi Ishmael said, 'Happy art thou, Ben Damah, for thou hast departed in peace, and hast not broken through the ordinances of the wise; for upon every one who breaks through the fence of the wise, punishment comes at last, as it is written (Eccles. x. 8): Whoso breaketh a fence a serpent shall bite him.' "

*b.* In Jerusalem Shabbath 14*d* we read the same almost word for word with the addition at the end: "The serpent only bit him in order that a serpent might not bite him in the future. And what could he (Ben Damah) have said? (Lev. xviii. 5): 'Which, if a man do, he shall live in them' (i. e., not die in them)."

*c.* In Jerusalem Aboda Zara 40*d*, 41*a*, we find the same as in *a* above, except that after the words "came in to cure him," is added, "He said, 'we will speak to thee in the name of Jeshu ben Pandira.' "

*d.* In the Babylonian Talmud Aboda Zara 27*b* we read thus: "It happened that Ben Dama, son of Rabbi Ishmael's sister, was bitten by a serpent. There came Jacob of Kephars S'khanja to heal him, but Rabbi Ishmael would not allow him. Ben Dama said, 'Rabbi Ishmael, my brother, allow me to be healed by him, and I will bring thee a verse from the Torah that this is permitted.' But he had not finished his discourse when his soul departed, and he died. Then Rabbi Ishmael exclaimed over him: 'Happy art thou, Ben Dama, for thy body is pure and thy soul hath passed away in purity and thou hast not transgressed the words of thy companions, who have said (Eccles. x. 8): Whoso breaketh through a fence, a serpent shall bite him.' "

As to the details of the story, there is little variation among the several versions given above. In all, the Chris-

tian proposes to heal the sick man in the name of Jesus ben Pandira, but Ishmael would rather have his nephew die than have him cured through the name of Jesus.

Leaving out of sight the fanaticism of this rabbi, we can only say that our narrative confirms the New Testament which records the miracles of Jesus and his disciples.

## 2. *Jacob the Teacher.*

1. In Tosephta Hullin II, 24, we read: "The case of Rabbi Eliezer, who was arrested for *Minuth*,<sup>1</sup> and they brought him to the tribunal for judgment. The governor said to him, 'Doth an old man like thee occupy himself with such things?' He said to him, 'Faithful is the judge concerning me.' The governor supposed that he only said this of him, but he was not thinking of any but his Father who is in heaven. The governor said to him, 'Since I am trusted concerning thyself, I will also be in this. I said, Perhaps these societies err concerning these things. *Dismissus*, Behold thou art released.' And when he had been released from the tribunal, he was troubled because he had been arrested for *Minuth*. His disciples came in to console him, but he would not be comforted. Rabbi Akiba came in and said to him, 'Rabbi, shall I say to thee why thou art perhaps grieving?' He said to him, 'Say on.' He said to him, 'Perhaps one of the *Minim* (i. e., Jewish Christians) has said to thee a word of *Minuth* and it has pleased thee.' He said, 'By Heaven, thou hast reminded me! Once I was walking along the street of Sepphoris, and I met Jacob of Kepharsichnin, and he said to me a word of *Minuth* in the name of Jeshu ben Pantiri, and it pleased me. And I was arrested for words of *Minuth* because I transgressed the words of Torah (Prov. v. 8): Keep thy way far from her, and come not nigh the door of her house (vii. 26), for she hath cast down many wounded.'"

<sup>1</sup> I. e., a leaning towards Christianity.

2. In the Talmud *Aboda Zara* 16*b*, 17*a*, we read the following: "Rabbi Eliezer was seized on the charge of being a Christian. The judge said to him, 'Thou, an aged man, to busy thyself with such idle matters!' He replied, 'I admit the faithful reproof of the judge.' The latter, thinking that he referred to him, whereas he really meant God, said: 'Since you trust me you are discharged.' He went home deeply distressed, and would receive no consolation from his disciples. 'Rabbi!' cried Aquiba, 'Allow me to say something which I have learned from thee.' 'Say it,' was the reply. Hast thou not had a dispute with a Christian, and by approving what he said, got thyself into trouble?' 'Aquiba!' said he, 'thou just remindest me of a certain incident. Once upon a time I was walking in the upper street of Sepphoris, when I met one [of the disciples of Jesus of Nazareth], whose name was Jacob, a man of Kefr Sekanja, who said to me: "It is written in your law: Thou shalt not bring the hire of a whore into the house of the Lord thy God (Deut. xxiii. 18). May a sink be made with it for the high priest?" This question I could not answer. Whereupon he said to me: 'Jesus of Nazareth taught me thus on the subject. It is written, He gathered it of the hire of an harlot (Micah i. 7); that is, it came from an impure source, and it may be applied to an impure use." When I heard this explanation I was pleased with it, and on this account I was accused of heresy, because I trespassed against the word: Remove thy way far from her (Prov. v. 8; "from her," i. e., from heresy).'"

3. The same story is also found in the Midrash on Eccles. i. 8, where the reading is: "Thus has Jesus son of Pandera taught," whereas the Talmud reads: "Jesus the Nazarene."

The Eliezer here mentioned is Rabbi Eliezer ben Hyrcanos,<sup>2</sup> brother-in-law of Gamaliel II, the grandson of Ga-

<sup>2</sup> See the interesting treatise of Toettermann, *Rabbi Eliezer ben Hyrcanos*

maliel I, the teacher of Paul. That Eliezer was a famous teacher can be learned from the fact that he is mentioned 324 times in the Mishna. Now this famous teacher acknowledges that he was pleased with an explanation given by Jesus of Nazareth. This teaching Eliezer received from a certain Jacob, one of the disciples of Jesus, and whom the Jewish historian Graetz identifies with the apostle James.<sup>3</sup>

The genuineness of this incident is defended by the late Jewish scholar Derenbourg in *Essai sur l'histoire et la géographie de la Palestine*, pp. 357-360, although Edersheim in *Life and Times of Jesus the Messiah* I, 537, declares it to be plainly apocryphal. But there is no ground to reject the evidence of a man so well known as Rabbi Eliezer, especially as it tells against himself. The story seems to be well authenticated.

#### ANOTHER CHRISTIAN WHO PERFORMS MIRACLES.

In Jerusalem Shabbath 14*d* we read: "The grandson [of Rabbi Joshua ben Levi] had something stuck in his throat. There came a man and whispered to him in the name of Jeshu Pandera, and he recovered. When he (the Christian) went out, Joshua said to him, 'What didst thou whisper to him?' He said to him, 'A certain word.' He said, 'It had been better for him that he had died rather than this had happened.' And it thus befell him, 'as it were an error that proceedeth from the ruler' (Eccles. x. 5)."

The meaning of the quotation from Eccles. x. 5 seems to be that the fact of the child having been cured by a Christian was a deplorable evil which could not be undone, as the command of a ruler given in error, and implicitly obeyed, may result in mischief which cannot be afterwards

*sive de vi qua doctrina Christiana primis seculis illustrissimos quosdam Judaeorum attraxit*, Leipsic, 1877.

<sup>3</sup>Gnosticismus und Judenthum, p. 25, note 22.



put right. The saying is characteristic of the feeling of Jews towards Christians in the third century in Palestine.

#### A CHRISTIAN JUDGE APPLIED TO.

In the treatise *Shabbath* 116*a, b*, we read: "Imma Shalom was the wife of Rabbi Eliezer, and sister of Rabban Gamaliel. There was in her neighborhood a philosopher of whom report said that he would not take a bribe. They wished to have a laugh at him. So she brought him a golden lamp, and they went before him. She said: 'I wish them to apportion unto me of the property of the family.' He said to them, 'Divide it.' He (Gamaliel) said: 'We have it written: Where there is a son, a daughter does not inherit.' He (the judge) answered, 'From the day that ye were exiled from your land, the law of Moses has been taken away, and the law of the Evangelion has been given, and in it is written, "A son and a daughter shall inherit alike."' Next day, he (Gamaliel) brought him a Libyan ass. He (the judge) said to them, 'I have looked further to the end of the book, and in it is written: "I, the Gospel, am not come to take away from the law of Moses but to add to the law of Moses," and in it (the law of Moses) is written, "Where there is a son, a daughter does not inherit."' She said to him, 'Let your light shine as a lamp!' Rabban Gamaliel said to her, 'The ass has come and trodden out the lamp.'"

Whether the story is intended to represent more than to show the venality of this judge, is difficult to say. It is also questionable whether the philosopher possessed a text of the Gospel at all. It is more likely that he quoted what seems to be a "saying of Jesus" from a defective memory, and in this perverted form the sentence passed into the Talmud.

With this last story we have exhausted all the Talmud passages collected by Dalman. But we cannot stop here,

because we believe that still more can be derived from an examination of the Talmud. We mean especially the numerous sentences which in the Talmud are placed specifically in the mouth of Jewish authorities, but which might with greater correctness be ascribed to Jesus. Of this we shall speak further on. For the present we continue our notices on the followers of Jesus.

#### CHRISTIANS STUDY THE SCRIPTURES.

In the Talmud *Aboda Zarah 4a* we read the following: "Rabbi Abahu recommended Rabbi Saphra to the Christians as a good scholar. Thereupon the Christians remitted his taxes for thirteen years. But it happened that one day Rabbi Saphra was asked to give an explanation of Amos iii. 3, 'You only have I known of all the families of the earth; therefore I will punish you for all your iniquities,' adding, 'How can you suppose God to vent his wrath on one whom he addresses as his friend?' Rabbi Saphra was unable to reply. The Christians then took him, tied a rope round his head, and tormented him. When Rabbi Abahu came and found him in this plight, he demanded of the Christians: 'Why do you torment this rabbi so cruelly?' They replied, 'Did you not tell us that he was a very learned man? To the first question we asked of him he was unable to make any answer.' 'I did, indeed,' answered Rabbi Abahu, 'say that he was a good scholar in the Talmud, but not in the Scriptures.' 'But how is it that you understand the Scriptures and he does not?' To this Rabbi Abahu answered: 'We, who come in contact with you Christians are obliged, for our self-preservation, to study the Scriptures; because you dispute so often with us from the Scriptures, and because we know that you study them; but the other Jews, who live among Gentiles, have no need of that, as they do not dispute with them concerning the Scriptures.'"

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What a gloomy picture! The Jews read the Scriptures, not because they were concerned about the "one thing needful," but only for the sake of controversy!

Another illustration of the acquaintance of the Christians with the Scriptures is contained in Talmud Yoma 40b: "The disciples asked Rabbi Akiba, whether, in case that the lot appointed the goat which stood on the left of the priest for a sacrifice in the Temple, the position of the goats should be changed? He replied, 'Give the Christians (*minim*) no occasion for assailing us'; or as Rashi, the commentator, explains it: 'To the disciples of Jesus of Nazareth who discourse concerning the Scriptures, that they do not say you (Jews) act arbitrarily.'"<sup>4</sup>

#### ENACTMENTS AGAINST THE WRITINGS OF THE CHRISTIANS.

That the Gospels and other writings of the *Minim* (i. e., Christians) were in circulation at an early time, we see from the many enactments of the Jewish rabbis against them. At the time that the rules for keeping the Sabbath were under consideration, it was asked in the schools whether, if the Gospels and other books of the Christians should happen to fall into the fire, it would be permissible to rescue them from the fire, inasmuch as the name of God was written in them, and they contained numerous quotations from the Old Testament. On this matter we read Tosephta Shabbath, XIII, 5: "The Gospels and the other books of the Christians they do not save, but these are burnt in their place, they and their sacred names. Rabbi José the Galilean says, 'On a week-day one cuts out the sacred names and hides them and burns the rest.' Rabbi Tarphon said, 'May I lose my son! if they come into my hand I would burn them and the sacred names too. If the pursuer were pursuing after me, I would enter into a house

<sup>4</sup> So in the Venice edition, quoted by Goldfahn, in Graetz's *Monatsschrift*, 1873, p. 109.

of idolatry, but would enter not their houses. For the idolaters do not acknowledge Him (i. e., God) and speak falsely concerning Him. And concerning them the Scripture says (Is. lvii. 8): And behind the doors and the doorpost thou hast set thy memorial.' Rabbi Ishmael said, 'Whereas in order to make peace between a man and his wife, God says (cf. Num. v. 23): Let my name which is written in holiness be blotted out in water, how much more should the books of the Minim, which put enmity and jealousy and strife between Israel and their Father who is in Heaven, be blotted out, and their sacred names too. And concerning them the Scripture says (Ps. cxxxix. 21), Do I not hate them, O Lord, which hate thee, and I loathe them that rise up against thee. I hate them with a perfect hatred, and they have become to me as enemies. And even as men do not save them (the books) from burning, so do they not save them from falling (from a building), nor from water, nor from anything which destroys them.' "

Almost the same thing we read in Jerusalem Shabbath 15c and Babylonian Shabbath 116a. There we see that not even the strict observance of the Sabbath was to stand in the way of the instant destruction of the books of the Minim; nay, the terrible profanity of destroying the names of God which were thought to give the material on which they were inscribed a special and inviolable sanctity, was set aside, and this not only on the Sabbath, when the cutting out of them might be held to entail "work," but according to Rabbi Tarphon, even on week days.

That, according to Rabbi Akiba, those have no portion in the world to come who read in books outside the canon (i. e., books of the Minim) we have already noticed above. Nevertheless the Gospels circulated, at least the Gospel of Matthew. For whatever may be the date assigned to it by modern critics, certain it is that in some form it circulated at a very early date. In the Talmud Sanhedrin 90b

we read that Gamaliel II (who died about the year 110 A. D.) was asked: "How do you know that the dead will rise again?" He adduced passages in proof of the resurrection from the law (Deut. xxxi. 16), the Prophets (Is. xxvi: 19) and the Hagiographa (Song of Songs ix). These passages were rejected as insufficient. He finally quoted the words "the land which the Lord swore unto your fathers to give them" (Deut. xi. 21). Since the fathers were dead, the passage must have promised a resurrection, when alone the land could be given to these fathers. This shows the force of the interpretation given by Jesus in Matt. xxii. 32 ("I am the God of Abraham, and the God of Isaac, and the God of Jacob! God is not the God of the dead, but of the living"), and the inference he deduced therefrom.

#### ENACTMENTS AGAINST THE FOLLOWERS OF JESUS.

On several occasions we have referred already to the intercourse between the rabbis and Jewish Christians,<sup>5</sup> which shows that Minuth (i. e., Christianity) had an attractive power. In order to break its influence and to check its growth, shortly before the destruction of Jerusalem the first formal anathema was hurled by the entire Rabbinic assembly, which had met at Jannia or Jabneh,

<sup>5</sup>As another illustration we quote the following from *Midrash Koheleth* on Ecclesiastes, i. 8: "Rabbi Hanina, nephew of Rabbi Joshua, went to Capernaum, and the Christians bewitched him and made him ride into the town on an ass upon the Sabbath. When he returned to his uncle, Rabbi Joshua gave him an unguent which healed him from the bewitchment. But Joshua said to him: 'Since you have heard the braying of the ass of that wicked one, you can no longer remain on the soil of Israel.' Hanina went down to Babylon and there died in peace.—Farrar, who quotes this story in *Expositor*, Vol. VI, 1877, p. 423, says: "The expression 'the ass of the wicked one' is only too plainly and sadly an illusion to the ass ridden by our Lord in his triumphal entry into Jerusalem; and the suppression of the name Jesus is in accordance with the practice of only mentioning Him in an oblique and cryptographic manner.—Lowe (*Fragment of the Talmud Babli*, Cambridge, 1879, p. 71) translated for "ass" *wine*—in the Talmud both words are expressed the same—and thinks that the Christians intoxicated him with the wine of the *agapai*, which they seem to have celebrated on Friday night. More probable, perhaps, is the meaning of Delitzsch (*Ein Tag in Capernaum*, Leipsic, 1873, p. 25) who says that the "ass of that wicked" refers to the foolish preaching of the crucified

under the auspices of Gamaliel II. Thus the great Rabbi Moses Maimonides<sup>6</sup> (died 1204 A. D.) says: "In the days of Rabbi Gamaliel the *minim* increased in Israel, and afflicted Israel, and seduced men to turn away from God. Then when he saw that it was indispensably necessary, he instituted that imprecation in which God is besought that the *minim* should be destroyed, and added it to the eighteen prayers, so that the whole number now found in the Prayer Book is nineteen." Thus far Maimonides in Hilcoth Tephilla, chap. II.

From the Talmud we learn the history of the prayer which is as follows: "Simon Pakuli arranged the eighteen benedictions before Rabbi Gamaliel in the present order at Jabneh. Said Rabban Gamaliel to the sages: 'Is there none who knows how to prepare a benediction against the *minim*?' Then arose Samuel the Little and prepared it (Talmud Berachoth 28b)." This prayer, which now forms the twelfth of the so-called Eighteen Benedictions or Shemoneh Esreh<sup>7</sup> reads now: "O let the slanderers have no hope; all the wicked be annihilated speedily and all the tyrants be cut off quickly; humble thou them quickly in our days. Blessed art thou, O Lord! who destroyest enemies and humblest tyrants."

That this was not the original form is clear from the different recensions of this prayer which exist. Thus Reichardt copied from an old manuscript the following form: "Be thou not a hope to the *meshumadim* (i. e., apostates), but may the *minim*, the double-tongued, the infidels, the traitors, perish together in a moment; may the enemies of thy people Israel be speedily annihilated; mayest thou speedily destroy the kingdom of pride and rend it in pieces; mayest thou humble them speedily in these our days.

<sup>6</sup> The Jews call him the "second Moses," whereas Moses Mendelssohn is styled the "third Moses."

<sup>7</sup> See my article "Shemoneh Esreh" in McClintock and Strong's *Cyclop.*

Blessed art thou, O God, for thou shalt break into fragments the wicked, and humble the proud."<sup>8</sup> Another form is given by Dalman, "Let there be no hope for the apostates, and the kingdom of pride mayest thou destroy quickly in our days. And let the *Nazarenes* and the Christians suddenly perish. Let them be extinguished from the book of life and not be written with the righteous. Blessed art thou, O Jahve, who humblest the wicked."<sup>9</sup>

Whatever the form of the so-called *Birkath ha-minim*—as the prayer is called—may have been, its existence is attested by Epiphanius, who says that the Jews curse and excommunicate the Nazarenes three times during the day.<sup>10</sup> The same we also learn from Jerome<sup>11</sup> and Justin Martyr.<sup>12</sup> In spite of all stringent measures the numbers of believers increased. As many cherished the Christian faith in secret, it was enacted that in case a reader erred in one of the benedictions, he was not to be removed from the reading-desk, but in case he erred in the benediction against the *minim* he was to be removed, because he was then suspected of being a *min* himself.<sup>13</sup>

#### ENACTMENTS AFFECTING CUSTOMS AND USAGES.

The influence of Christianity being felt more and more, the rabbis changed some of their ancient customs. Thus

<sup>8</sup> *The Relation of the Jewish Christians to the Jews in the First and Second Centuries*. London, 1884, p. 46.

<sup>9</sup> *Die Worte Jesu*, p. 299 et seq. See also *Jewish Quarterly Review*, X (1898), 654 et seq.; Bousset, *Die Religion des Judentums im neutestamentlichen Zeitalter*, 1903, p. 155 et seq.; Fiebig, *Der Mischnatractat Berachoth* (1906), p. 28.

<sup>10</sup> *Adversus Haeres.*, XXIX, 9 (ed. Petav., p. 124).

<sup>11</sup> *Ad Jesajam* V, 18-19; XLIX, 7; LII, 4 et seq. (ed. Vallarsi IV, 81, 565, 604).

<sup>12</sup> *Dialogus cum Tryphone*, chap. 16.

<sup>13</sup> Strange to say the Talmud *Berachoth* 29a records that one year after the composition of this prayer against the *minim*, its very author while before the reading-desk could not remember it and spent from three to four hours in trying to recall it to his mind without avail. He was, however, not removed. Had the author changed his mind with regard to those for whom his prayer was intended? or did he himself belong to the church? or was he already a member of the church when he composed this prayer extempore and composed it only in order to avert suspicion of being a *min* himself?



the "standing men"<sup>14</sup> used to fast on several days of the week, but not on Sunday. And why did they not fast on the day after the Sabbath? Rabbi Jochanan says, "Because of the Nazarenes" (Talmud Taanith 27*b*). The idea is that those who fasted had not to work, and a cessation from work on Sunday might have the appearance of observing the Christian Sunday (i. e., when the Temple was still in existence).

We also read that it was proposed that the Ten Commandments, which were recited every morning in the Temple, should be recited in the synagogues throughout the land; but this was not carried into effect because of the "carping of the *Minim*" (Talmud Berachoth 12*a*), or as the Jerusalem recension (Berachoth 3*a*) explains, "because of the misrepresentation of the *Minim* that they might not say, 'These alone were given to Moses on Sinai.'"

But this was probably not the reason. The real ground seems to me to have been to avoid conforming a part of the Jewish service to the Christian, and thus making the joining of the church much easier. We know not whether the first Christians recited the Ten Commandments. But may not Pliny in his letter to Trajan (*Epist.* 97) have reference to them when he writes that the Christians bound themselves by an oath, not for any guilty purpose, but "not to commit thefts, or robberies, or adulteries, not to break their word, not to repudiate deposits when called upon?" (*Sed ne furta, ne latrocinia, ne adulteria committerent, ne fidem fallerent, ne depositum appellati abnegarent.*)

Another curious example of the necessity which the Jews felt of protesting against the Christians is the following: The inhabitants of Jericho were in the habit of repeating each to himself, in a low voice, the words "Blessed

<sup>14</sup> "Standing men" has reference to those Israelites who were commissioned to act as delegates, representing the nation at the Temple in Jerusalem, and because they had to *stand* near the priest during the offering of the daily sacrifice, they were called "the standing men."

be the name of the glory of His kingdom for ever and ever," after the Shema<sup>15</sup> (i. e., "Hear, O Israel, the Lord our God is one God," Deut. vi. 4) had been recited aloud. But, says Rabbi Abahu,<sup>16</sup> "it was enacted that the words should be repeated in a loud voice, on account of the carping of the Minim. But at Nehardea (in Babylon), where there are no Minim, they repeat them to this day in a subdued voice" (Talmud Pesachim 56a).

Great care was taken that the prayers contained not the least sign of a Christian phraseology. Thus we read: "A person who, in his prayer says 'the good shall bless thee,' lo, this is a Christian manner (the way of Minuth); but if one says, 'thy mercies extend even to the birds' nests,' 'let thy name be remembered for good,' 'we praise, we praise,' he shall be silenced (Mishna Megilla IV, 9; Bera-choth V, 3)."

The Mishna is the oldest stratum of the Talmud, and our passage is one of the few in the Mishna which refer directly to *minuth* or Christianity. The meaning is obscure, but it is possible that the reference is here to some ancient Christian liturgical forms. May not the words "thy mercies extend even to the birds' nests" have had reference to Matt. x. 29? Whatever the reason, the reader was silenced.

Even the dress of the person who acted as reader of the synagogue was made a test. Thus we read in Mishna Megilla IV, 8: "If a person should say, I will not go before the Ark in colored garments, he shall not do so in white ones. If he refuses to minister with sandals on his feet, he shall not do so even barefoot." To this Mishnaic injunction the Gemara remarks, that the reason for this is because such a one might belong to the Christians. Rashi,

<sup>15</sup> The watchword of the divine Unity.

<sup>16</sup> As he was a great opponent of the Minim, there must have been some reason for the enactment.

in his commentary on that passage remarks that the Christians used to pay attention to such things.

Because the Christians used to pray towards the east, doubts were expressed as to the feasibility of having the face turned eastward during prayer, and in order to protest most emphatically against the increasing heresy (i. e., Christianity), it was recommended to turn the face westward during prayer, and the Talmud Baba Bathra 25a states of Rav Shesheth, who was totally blind, that he ordered his servant to place him in any other but the eastward direction when he wished to pray, because the Minim turned in that direction. The commentator on this passage, Rashi, refers it to "the disciples of Jesus."

From all this it is evident that the growth of the Christian Church must have been very rapid, otherwise the synagogue would not have required these measures, intended to check the advancement of the Gospel.

BERNHARD PICK.

NEWARK, NEW JERSEY.

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## CRITICISMS AND DISCUSSIONS.

### DEATH AND RESURRECTION.

"What matters it if searching mind sublime  
Would doom the lights of Heaven to die;  
If hosts of stars were swept from sky  
As golden harvests by the scythe of time?  
Thy righteous thoughts and what thy love conceived,  
Thy beauteous dreams are not by time impaired;  
They grow a harvest from that scythe-man spared  
And treasures in celestial stores received.  
Go forth, Humanity, on journey blessed,  
Rejoice, eternal life dwells in thy breast."

V. Rydberg.

(From the Swedish by J. E. Fries.)

*Death and Resurrection* is the title of a remarkable book just published by The Open Court Publishing Company. Its author, Gustaf Björklund, who died in the year 1903, was a philosopher with a marked influence on modern thought in his native country, Sweden. As an ardent worker in the international peace movement he is known also far outside that country. He never occupied a professor's chair nor any official position whatsoever, but devoted his entire time to quiet studies and the compilation of a series of thoughtful volumes. Young, liberal Sweden has drawn heavily upon the funds of undogmatic wisdom that this unassuming thinker accumulated in his several books. It is our confident hope that this, his last work, will prove equally valuable to an interested public on this continent.

The most noteworthy characteristic of Björklund's method of treating his subject is the great thoroughness with which he investigates the arguments of his opponents. After reading the present volume we cannot for a moment doubt the statement in the author's preface that his studying of the physical and chemical foundations of modern materialism alone required his exclusive attention

for several years. It may be well to remember this at a first reading of the book—if read once, it will surely be read over again—because the critical student will meet many statements which he by no means is ready to accept without previous proofs. We must not suspect the clear, logical intellect of Björklund to have overlooked this, and if we only keep our point in mind we shall invariably find sooner or later the desired demonstration. The reason for this strange arrangement is to be found in the dramatic construction of the book. Björklund gradually works up to a climax and is not inclined to give away his thunder too early.

In giving a résumé of *Death and Resurrection* it may be advisable, therefore, to turn the barrel upside down, so to speak, first pointing out the aim of Björklund and subsequently endeavoring to follow the line of argument by which the author proves his thesis.

Björklund is an idealist, yea, a spiritualist. And yet he gives such convincing proofs of the impossibility of any thing that may be classified under the heading "spirit-communications," that Sir Oliver Lodge and Prof. J. H. Hyslop must turn from him in scorn. On the other hand he differentiates between the material and spiritual world so distinctly that any one who, like Dr. Paul Carus, makes the, in the writer's opinion, futile attempt to reconcile the two, finds in him an equally decided opponent. The publishing of the present volume, therefore, reflects great credit on the part of Dr. Carus and is a new monument among many to his openmindedness and unflinching desire to bring every possible argument against his philosophy under discussion.

A large part of *Death and Resurrection* is naturally devoted to the demonstration of the contrast between life or life-force on one hand, and physical energy in all its forms on the other. Here Björklund and Dr. Carus differ radically. True, even the latter is obliged to concede that life-force is a very unique form of energy. In his article "Life and the Soul" (*Monist*, April, 1908) he says, that the process of life is a phenomenon *sui generis*, more complicated than any purely physical or chemical process; "Vitality or the function of life is a kind of energy of its own. In this sense we may retain the old idea of vitalism in a modernized form and classify life by itself"; and again: "We would say then that the function of life is a manifestation of energy which forms a category of its own. It is as different from physical processes as chemical combinations are different from purely mechanical movements—or even more so." But to take the full step and acknowledge that life has no roots what-

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ever in the material world he will not, he cannot, because a spiritual world does not fit into his philosophical system. It is necessary to the theory of Dr. Carus and to that of pure materialists alike, that the formation of a Homunculus be possible in theory if not in practice.

With no other resources than the material world to fall back upon, how then did life grow out of matter and physical energy? We face again the time-worn question of *generatio aequivoca*. If spontaneous generation could be proved without the shadow of a doubt to be impossible, then, surely, we must look beyond the boundaries of the visible world for the origin and substance of life. This is what Björklund does in the volume under consideration.

But first let us see what the materialist, and Dr. Carus with him, has to say on this subject. In this respect the two reason exactly alike. In the article referred to above, Dr. Carus says: "Living bodies consist of the very same materials of which the rest of the world is composed. Chemistry has resolved matter into some seventy elements, and the elements of organic chemistry are absolutely the same as those of inorganic chemistry. Some of the most unstable and lightest elements play the most important part in the function of life, for we may say that oxygen, hydrogen, nitrogen and carbon are the most essential factors in building up living organisms." . . . "They [the naturalists] have succeeded in producing organic matter, the first substance thus secured being urea, but they have not succeeded in building up an organism, and there is scarcely any hope for success in producing the smallest living bacterium. This repeated failure has caused mystics to claim emphatically that life is a mystery that never can be solved, but in fact it only proves that the original life-forms are too small to come as yet under our notice. If we only consider that the smallest fungi are about as complicated in comparison to atoms, as the tree is in comparison to a cell, we will understand that we need better microscopes than are now at our disposal before we can discover the most primitive form of life.

"Theoretically considered it should not be impossible to reproduce life. The tendency of certain elements to organize into life-plasm is in itself no more mysterious than chemical affinities or the formation of crystals.

"There is no consistency in the methods of those who see nothing extraordinary in purely physical processes but are overawed when contemplating the basic fact of all biological phenomena, the

formation of living structures. There is no less reason why the simplest life-forms under favorable conditions should not organize certain elements into the structure of life-organisms than for vapor to assume the form of snow crystals in the air at a given temperature, and neither process is theoretically incomprehensible. Both are equally mysterious and equally possible."

Consequently, because every organism consists of nothing but the elements to be found in nature and because each and every one of its functions is performed according to natural laws—therefore nature has of its own accord built the organism. Why have we not discovered nature in the act of doing this? Because our microscopes are not powerful enough. When did, or do, such wonderful combinations of the elements take place? Under favorable conditions. What would constitute favorable conditions? No answer. The spontaneous formation of the snow crystals and of the as yet undiscovered most primitive forms of life is equally mysterious and equally possible. The first part of this last statement is true, the second false, as we presently shall see.

This way of reasoning is so characteristic of the materialist that Björklund has found the same lines of thought almost verbally given in Büchner's book, *Kraft und Materia*, and he has consequently answered Dr. Carus long ago.

We might just as well, says Björklund, make the following statement: No atom in a steam engine differs from similar atoms in surrounding nature; every movement of the engine is performed in the strictest accordance with natural laws; therefore nature has spontaneously built the steam engine without the interference and guidance of a supernatural being, here man. It is of no use to argue, that nature first developed man and through him the engine, because even Dr. Carus admits that the most primitive form of life also is fundamentally constructed as a steam engine, that is, consists of organized matter. "The terms 'living' and 'organized' are synonymous," says Dr. Carus. The only difference is that matter is so much more crudely organized in the engine than in the living units that constitute the organic cell. Little would it profit us in our endeavor to find the truth or non-truth of *generatio spontanea* even if our microscopes were powerful enough to allow us to observe the individual atoms or even the corpuscles of which they are perhaps composed.

To quote Björklund. "Even if we were observing with our own eyes the creation of the first organism we would not be able to

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say whether it were the result of natural or supernatural forces. The moment our study commenced the mystic act of creation would already have taken place, an act which lies beyond the boundaries of research, and which we never shall be able to penetrate however minute or comprehensive our observations."

And even if we could scientifically prove that every single being on earth at present has had parents; even if we could trace life back through endless generations to Lord Kelvin's "moss-clad fragment" from another world, or to Professor Arrhenius's spore, brought to our little globe from some distant star in the universe by the radiation pressure of light, we would still be just as much in the dark as to the origin of life. We would have to extend our researches to every planet inhabited by life to ascertain whether the "favorable conditions" existed there, and if not at present, then perhaps some millions of years ago, or would, (why not?) after some millions of years to come, because one single exception to Harvey's law, *omne vivum e vivo*, will suffice to bring the palm of victory into the hands of the materialists.

This whole method is consequently unsatisfactory. To quote Björklund again: "An entirely different method is here necessary; our endeavor must be to find the innermost cause to the whole series of generations evolving throughout the ages. We must in other words derive Harvey's law from the inner nature of matter itself, show that this matter has such qualities that it cannot, never could and never will be able to produce a single living being. Only then shall we have demonstrated that Harvey's formula is a universal, natural law and then it will be not only our right but our duty to draw its logical consequences."

Now then, why is not life force a form of physical energy, including its every known form, gravity, light, heat, chemical affinity, magnetism, electricity or radio-activity? Why cannot living substance or organized matter spontaneously be formed by inert substance, such as we find immediately on earth and by the spectro-scope in other parts of the universe? Because physical energy tends to *equilibrium*, life force to *unstable compositions*; because inert substance is a *natural product*, organized matter a *product of art*.

Let us consider a moment the truth, meaning and tremendous weight of this argument.

Take for instance the evolution of our own globe. We have been accustomed to think of the formation of the celestial bodies as

a continuous cooling off from the gaseous state to a stage when life may appear, and further to a condition like that of our moon when they become uninhabitable again. According to this view the whole of the universe is slowly approaching a certain end, Clausius's "thermo-death" when all heat is evenly distributed in the form of motion of the smallest particles of matter. Professor Arrhenius remarks, however, that as we know of no beginning of time, such "thermo-death" would long ago have pervaded the universe. He further demonstrates in his wonderful book *Worlds in Making* how the heat swings as an immense pendulum from the suns to the nebulas and from the nebulas to the suns again. Science at present, therefore, does not contradict philosophy in its demand that time must be unlimited in both directions. To the present status of science and philosophy as regards infinity of space I hope to return some other time in the pages of *The Monist*. Never and nowhere, however, has science found the laws of nature or physical energy to operate differently under equal conditions. The same causes are inevitably followed by the same results. If we therefore prove that physical energy never could or can create life spontaneously on our earth, the homogeneity and continuity of the universe as established by recent science, forces us to conclude that more "favorable conditions" have never and nowhere else existed or shall exist.

But the matter of our earth was once as hot as that of the sun, and was then rich in chemical energy. When sufficiently cooled off to allow chemical affinity to act, compounds as poor in energy as the conditions for the moment permitted, were always formed. The substances of our earth are the ashes resulting from violent chemical reactions. Hydrogen and oxygen "burned" into water. And so nature always tends to satisfy even the feeblest chemical affinity and never rests until it reaches perfect equilibrium. Even the decay that takes place, thanks to the water-circulation due to the sun's radiation, is nothing but a more thorough burning of the substances of our earth; that is, the remnants of the elements that did not find their mates in the primeval world-fire endeavor to satisfy their affinity, wherever a compound poorer in energy may possibly be formed. Thus physical energy is always and without exception falling from a higher to a lower level just as infallibly as the running stream. Indeed, the descending water is only another expression of the same natural law. Finally our earth reaches stagnation, as the moon has done before, and it will thus remain a petrified mummy, until a cosmic catastrophe scatters its substance over immense spaces form-

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ing parts of some vast nebula that again will slowly form "new heavens and a new earth" as described so admirably by Professor Arrhenius.

During a certain period of this history of our earth, lo and behold, there appear on its surface certain forces which most decidedly oppose the processes of physical energy. Out of the ashes of the original world-fire burnable matter is again formed. The most neutral compounds are decomposed again and new compositions formed which for a time fight successfully against the leveling tendencies of physical energy but finally succumb to the general, powerful law, decay or oxidize again just as the steam engine, when left to the mercy of nature, is dissolved speedily. It is as if the orderly evolution toward equilibrium suffered a temporary check. We say that "life" takes hold of inorganic matter and forces it to enter into unstable, organic compounds. "Life" utilizes nothing but natural laws in accomplishing its wonders. We are able to calculate the tremendous forces necessary to extract the organic carbon from its compounds and we find at once that such energy sources as are available, i. e., the earth's internal heat and the radiation from the sun are utterly unable without "artful" guidance to accomplish the result.

To quote Björklund: "The spontaneous activity of nature's forces, then, go in a direction just opposite to the one necessary for the production of organic substances. And nothing else was to be expected. The products of combustion resemble fallen weights, slack bow-strings, water below the fall, etc. Whereas combustible organic matter might be compared to lifted weights, set bow-strings, water above the fall, etc. If matter has once fallen from a higher to a lower level of energy it can never spontaneously return, especially as it has just lost the necessary store of energy. As impossible as it is for the swift current to turn its course, or for the fallen weight to lift itself, or for the discharged bowstring to set itself again, so impossible is it for the products of combustion spontaneously to turn into combustible substances.

"From this we now draw the extremely important conclusion that all organic matter is a *product of art*, that is, a product which the forces of nature cannot spontaneously produce."

The quality in matter which causes its inability to "turn the current" is called *inertia*. Inert matter cannot spontaneously deviate from its course; a foreign interference is necessary.

In building a living being, life does exactly, only in a more

perfect way, what man does in building a steam engine. Man reduces the carbon in the ore and so does the cell in the chlorophyll. The chlorophyll granules therefore are strikingly comparable to our blast furnaces. But herewith life's quality of being a product of art is not yet fully emphasized.

Let us quote Björklund again: "No effect, whatever its nature, can exist without cause; and further every effect must have sufficient cause. If therefore we have established that natural forces can no more produce organisms than steam engines, we have also proved that these things would never have come into existence if the inorganic forces had been left to themselves. Neither organisms nor steam engines would exist because they have no cause in the material world. The products of art are not only due to other causes but moreover the relationship between cause and effect is different with them from what it is with the products of nature. Every product of nature has its cause in a previous condition of matter. The cause goes before and the effect comes after in time. The connection between cause and effect is so intimate and complete with regard to the natural products that we may trace the series of occurrences backward and forward in time without other limitations than those imposed by a deficient knowledge of the qualities of matter. Such a connection between cause and effect has been termed *mechanical causality* which reigns without exception in the material world.

"Of entirely different kind and nature is the series of causes pertaining to the production of objects of art. In their capacity of purpose, they are themselves the physical cause of all the work that precedes their birth. When the product of art is finally ready the effect has then gone before the cause. Such a connection is called a *teleological causality* in contradistinction to the mechanical one, where the cause always precedes the effect.

"But although the product of art is the nearest cause of its own production it is not the primary one; it is itself the result, not of a cause to be found in the material world, but of a *foreign* interference in the mechanical causality, and points therefore to a supernatural ground which by a closer investigation will be found identical with a living will. The will feels the want of other things than those natural forces can spontaneously produce. Natural products act as incentives on the will, spur it to break through mechanical causality so that physical laws by a judicious guidance may be forced to produce artificial products that better satisfy the desires of the will. If natural laws could comprehend and judge these things they would

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consider them all as miracles, whereas, from the point of view of the will, they are so much the more natural as they are exact expressions of the needs and desires of the will.

"But not only the order of cause and effect, even the tie between the two, is entirely different in teleological causality from that in mechanical. While the natural product is an effect that cannot fail to appear, the product of art on the contrary is an effect that primarily never could be expected, because it has no cause in the material world; but further, if it is forthcoming, the tie between cause and effect is so loose, that such a product may be left and will remain in any stage of its production. It may be just commenced, half ready, or nearly completed; be better or worse, be a failure and so on, whereas the natural product springs forth of physical necessity from its cause, and never can be different from what it is.

"Wills and physical forces then stand against each other as two fundamentally and radically different causes. A will may neglect to do what it ought to, may be idle, industrious, undecided; a physical force cannot leave undone what it has to do, can never be called idle, industrious or undecided.

That man is able to produce objects of art we have sufficient evidence in material invention from the simple stone-ax up to the most complicated machines. But if man can create products of art he must himself be a supernatural cause as natural products produce nothing but their own kind. And not only he, but also the beings that build up his organism must be supernatural causes as we have seen that all organic matter *ipso facto* is a product of art."

The sum total of human experience is composed of ponderable matter, measurable energy, life-force and its manifestations in organization, feelings, sentiments and thoughts. The two first items, surely, belong to the material world. They are the only ones that so far have constituted the field of research of natural science, and if Björklund's theory is right, they will forever so remain. The latest investigations into the nature of corpuscles go far towards making us believe that ponderable matter is also nothing but a form of physical energy, so that science will ultimately have to treat *measurable energy* by mathematics only. Will life-force with its manifestations of organization, love, hate, thoughts, etc., ever be laid under the domain of this science, will the results of our individual characters even *in abstracto* be subject to mathematical investigation? However incredible such an outcome may seem, we

were not justified in saying, "Impossible," until Björklund proved the intrinsic incompatibility between physical energy and life-force.

Life consequently has none of its roots in the material world. The form in which this world exists is, negatively expressed, limitation by time and space. Thoughts and feelings just as much as their cause, life, fall outside of these limitations or are immortal. "Immortality, then, belongs to every living cell as materiality to matter." The form too, as defined by Dr. Carus, is immortal for the same reason, but we have seen that nature, left to itself, would never have created one single organized form because the tendency of nature is to tear down every "form." Life appears in forms, but life is primary, form secondary. And how fortunate this is. Form, belonging to an immortal spirit, possesses unlimited immortality, but form, torn from life, is endowed with a queer kind of immortality which ends when humanity ends on earth. And as the final destruction of the world is a scientific fact, all the inhabitants of Tellus cease in that moment to exist. For a man, be he ever so real, does not exist alone in empty space, because there is nothing to react upon him; and Dr. Carus's "form" lives only as long as it is in organic touch with living generations. But I do not see where the reactions upon his form will come from when this globe is uninhabitable, unless the very matter of our earth is so transformed because of its existence that it will enter into different combinations when forming another planet than it would if it never had served to clothe a human being. Widely different of course is the immortality of a spirit unlimited by time and space.

Dr. Carus objects to a dualistic world-system but if he upbuilds his cosmos of physical energy and life force, calling the latter an energy *sui generis*, I for one cannot see why Björklund merits the title dualist more than Dr. Carus. In order to bring unity into the whole Dr. Carus must show the relationship between these two kinds of energy or at least, in order to bring the question under discussion again, overthrow Björklund's proof of their non-relationship. And if the manifestations of both are "equally mysterious" which indeed they are as we have as yet not discovered the fountain of either, why should Björklund's explanation be less acceptable to a rational mind than Dr. Carus's preservation of a form that physical energy never has shown a tendency to create or maintain?

We may suppose that Dr. Carus now admits the impossibility of *generatio spontanea* and accepts a dualism of physical force and life-force but declares both to be phenomena belonging to time and

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space. But then his preservation of form suffers the limitation referred to above, and what is more important, his system gives no explanation of the teleological order in the realm of life. A spiritual world that utilizes physical energy to certain ends and as an *evolutionary part* or *side* of its activity, offers on the other hand a satisfactory solution of these problems.

After having established that life is not "of this world" Björklund proceeds to analyze the organization of life, and we come now to that part of the book that has suggested its title.

Björklund has thoroughly studied modern cytology, and in it he finds strong reasons to regard every living cell as being ensouled with individual life in no lesser sense than man himself. Man is an individual composed of lower individuals, the cells, but he is himself a cell in an individual of higher order, humanity. We are able to comprehend in part only those beings next below and next above man: below the cells and above humanity there must be other living units until we reach the unifying soul of all life, the living God. Thus we, and the cells with us, are all living members in God's perfect organism. We are indispensable to the existence of God and He to ours. This does not mean that either man or God is lacking in personal individuality. The self-dependence and yet interdependence between any being and its lower constituents, is very fully discussed by Björklund.

We shall now endeavor briefly to follow this discussion.

Experiments carried out with animals show that the cell organization will remain alive and perform all vegetative processes even if deprived of the direct guidance of the animal soul. And similar observations have been made on men under certain conditions. Thus it is certain beyond doubt that the cells not only execute but, through the central nerve-system, regulate and control a multitude of functions in which the soul does not take part. But just as certain it is that there are many functions which the cells could not perform without the cooperation of the soul. Vision, hearing, smelling, tasting and feeling would be entirely meaningless to the cells without the aid of the soul. The same is in a high degree the case with the motions of the body which also require such a higher guidance. Deprived of its brain, "the dove could fly, the dog walk, and so forth, but the motions were relatively purposeless. The predetermined plan was lacking. The cells could assimilate the food, when brought into the body, but they could not search it in nature. Such action



requires a power of combination that exceeds their measure of intelligence."

"We see consequently that the cells may do without the soul in such functions as are not related to the exterior world, comprehensible to our senses. Here they need the guidance of a higher, more developed intelligence. In the outside world with its more complicated relations the soul is to the cells very nearly what we mean by the word *Providence*. The soul performs in the interest of the cells, such a higher, regulating and guiding function."

Björklund complains that the cells are continually studied from man's point of view but what man may be from the cell's point of view is never thought of: "We do not hereby deny to the old conception all justification. The body is also an organ for the soul. The latter, as experience shows, uses the body for its own specific purposes. But this takes place only to a somewhat limited extent. The incomparably larger part of the soul's work, cares and endeavors are devoted to find means for satisfying the bodily wants. But so far as the soul provides for the necessities of the body it acts as organ for the cells. When man believes that he is running his own errands he is in reality carrying out the missions of those beings that compose his body. These latter demand for their purposes, if not all, yet at least the largest part of the work the soul performs in this world."

Björklund further draws an admirable comparison between the organization of the cells and the organization of mankind, and shows how the cells in their sphere have reached a much higher degree of perfection than man has as yet in his realm of existence.

But let us return to the relationship between man and cells, or which is the same, between soul and body. It is very difficult now to avoid quoting Björklund *in extenso*, and we shall only be able to suggest the author's line of thought and refer the interested student to the book itself for obtaining the demonstration.

The cells and the soul live in entirely separate realms and their constitution is so different that they need not even be aware of each other's existence. And yet a continuous cooperation and intercommunication takes place. The connecting link is *the organism per se*. "From the point of view of the cells, the organism, with its different members and organs, was nothing but the collective expressions of individual wants. Now man comprehends as his needs only the wants of the organs; in other words, the collective wants of the cells are the individual wants of the soul. Experience teaches us that the

soul has no direct comprehension of the cells but only of their organic unions. To prove this it may be sufficient to point out that before the discovery of the microscope man knew absolutely nothing of the existence of these beings, much less that they were the all-governing forces in his own body. But also in other ways we may ascertain that the comprehending power of the soul does not reach beyond the organs. This is apparent from the different significance the physiological processes have for the soul and for the cells. If we consider the most important of them all, our nutrition, and ask ourselves for whom the nourishment is really intended, we find that it is for the cells and for the cells alone.

"The food benefits the soul only if it is utilized by the cells. But the nourishment that the soul craves, does not satisfy the cells. Hunger and satisfaction are not even simultaneous in both, at least not as regards the same food. As a rule the soul comprehends hunger when the cells are satisfied and *vice versa*. The soul's hunger ceases the moment suitable food in sufficient quantity is introduced in the stomach. But this does not help the cells. Because, if the food remained in the stomach, to the satisfaction of the soul, the cells would soon die of starvation. The nourishment in the stomach is of the same importance to the cells as the provisions stored in the warehouse of the community are to the human individuals. These also would die from hunger if they let the provisions remain in the stores. The people must undertake to distribute, prepare and consume the food. Similarly the cells would starve to death unless they prepared the food in their common storage to suit their wants. The nourishment must be transformed into blood through the whole complicated process we call digestion. When this is done the cells are able to satisfy their craving, and simultaneously a new hunger feeling arises in the soul. Although it is the *same food* that satisfies both parties it is the same food in different form, at a different time and in a different mode. We are concerned with dissimilar beings possessed of wants, at once different and yet most intimately associated.

"The connection is not difficult to understand. When the soul comprehends the need of the stomach it is the collective wants of the cells that comes to expression as the individual want of the soul. The different needs receive in different form an identical substance, and this fact is obviously the connecting link between the soul and the cells. We might carry out the same reasoning in regard to the respiration and all the other physiological processes of the body."

living a life *separate* from that of God, Björklund continues in this connection:

"It is the perennial honor of Sweden's greatest philosopher, Christofer Jacob Boström, to have satisfactorily explained this extremely difficult and complicated question. He has shown that man, exactly on the supposition that he is an eternal part of God's being, requires and must go through an evolution in time. According to Boström religious intuition has found the truth that man is an eternal idea in God, a living member in His organism. But Boström has also understood and considered the difference implied in thinking of man as a member in God's organism and in thinking of this member as living its independent life. In the former case man possesses the same qualities as God; in the latter, these qualities with corresponding limitations.

"For an illustration of how all limited beings are incorporated in an absolute personality, Boström likes to fall back on the numerical system. Spiritual beings form a series, as it were, of lower and higher entities, where the latter contain the former pretty much as higher numbers contain the smaller." . . .

"But if Boström had lived to study modern cytology he would have found a more adequate comparison within man's organism, and one that perhaps in several respects would have modified his conception of the world of divine ideas.

"God is related to man, as man is, not to the cell, but to the lower units of which the cell is composed. Between God and man there is at least one other organism that we know of, namely humanity. But if we overlook this and for simplicity's sake imagine the relationship as that of man to the cell, it should be evident from what has been previously said, that man is and must be something else to God than he is to himself.

"To God he is what the cell is to man, a living part in His organism, and in this capacity he possesses all the perfect qualities of that organism. Living his independent life, man is in the same position as the cell in his own being, when the cell is thought of as living the life it is confined to by its less perfect organism.

"Although limited to that life the cell may literally be said to be man's image—but an image of a very singular kind. The cell does not reproduce man's traits as does a photograph or a statue, but within its lower realm it mirrors the fundamental qualities of the original on a very reduced scale.

"These limitations cannot be conceived by the cell as such be-

cause they are natural to it and belong to its entity. The cell is and must feel itself as perfect in its realm as man in his. Only if the cell could compare its condition with man's these limitations would become apparent to it, and such a comparison the cell really undertakes within certain limits. Into each feeling of want enters a comparison between the possessed and the desired. In the higher wants then, that drive the cells to upbuild man's organism we have a manifestation of such comparing power of the cell. Experience shows that the cell may live in a veritable natural state, but it is also, because of the presence of the soul in its innermost being, capable of a high culture, for the development of which it receives constant impulses and stimulations from the soul.

"In the same sense man may be said to be the image of God. Living in the world and in the natural state, to which he is confined by his relatively imperfect organism, man has the qualities of God with corresponding limitations. But even in this state he feels the spirit of God present in him because he is an original part of God's own organism. In his conscience and his religious feeling man not only comprehends distinctly the presence of God in his inner being but constantly receives also impulses, incitements and inspirations to develop that perfect life and heavenly kingdom, of which he is called by his high origin and divine birth to become a citizen.

"What the conscience and the religious feelings are to the will, the logical laws of thinking are to the reason, and in the latter man finds God again as immediately present as in the former. Indeed the logical laws are the form in which God himself exists.

"Because of God's presence in the eternal laws of our thinking man is able to appraise himself and his condition with an absolute measure and he can in this way obtain a certain knowledge of God's world and of his perfect qualities. He has only to abstract all wants and limitations from such qualities as have a positive content, because lack of want is perfectness."

In the following comparison between the finite and the infinite Björklund rises to a truly poetical height, but we must spare this part to a reading of the book itself.

"In this light, in this perfectness, man is a part of the divine entity. This life in God's eternal consciousness is man's primary and original existence. Only in a secondary meaning is he a self-existent personality, and is then no more identical with God than the cell is with man.

"Man as an entity for himself must have the natural limitations

of the part. Conceived by God man is eternal in the divine sense, but conceived by himself man's eternal life is clothed in the limitations we call time. The eternal was a constant present without beginning or end, without past or future. What is present to man must suffer these limitations; in other words, man must be born, must go through an evolution, or what is the same, become to himself what he has been eternally to God. In this respect man's relation to God may be compared to the relation of a newborn child to its earthly father. To him the nature and scope of the child is perfectly clear, but the child is unconscious of it and must awake to an understanding thereof, that is to say, must become to itself what it already is to its father.

"Living beings form a continuous series in the absolute organism. This series is such that the higher beings form the conditions and supports of the lower. This connection must be entirely reversed during evolution itself which naturally proceeds from the lower to the higher. In time therefore the generation and development of the lower beings must precede that of the higher. We have also seen that the evolution of the former is identical with the up-building of the organisms of the latter, and we understand now that the whole process *must* essentially follow the course which, as we have previously shown, it does in fact actually take.

"It is further the inherent idea of time that man's eternal entity cannot appear whole and undivided. He must plot it out along a series of successive moments which make room for only one cell-generation at a time. As the cell's entity again has a less comprehensive content than man's, its lifetime must be correspondingly shorter."

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Dr. Carus says in a letter to me that he does not see how Björklund's theory, interesting as it is, can be of any special value to religious or emotional life. A strange statement! Altogether apart from the question, whether it comes nearer truth than that of Dr. Carus or not, it first of all grants individual immortality to all living beings, whereas our life only lasts as long as humanity exists on earth according to Dr. Carus, as far as I can see. But of a widely greater emotional value is the relationship between God and man, which it intimates. If man on a small scale acts as Providence for the myriads of cells that compose his organism, an almost magic light is at once thrown on numerous questions which we but dimly understand from our point of view as cells in a higher organism,

but which we easily comprehend when considering ourselves the living unifying souls of communities of lower individuals. No warm prayer of an assembly of cells is unheard. The hunger feeling is satisfied if all the members do their duty at the soul's command. The pain in the finger speedily starts the soul to bring relief. The close interdependence between all the individuals in the ideal socialistic state organized by the cells in the body of man, is set forth, for instance, in the suffering of the head when the blood circulation in the feet ceases to function properly; this, to the utter astonishment of the communities in the head who are aware of no fault of their own. An "earthquake" takes place when the soul directs the surgeon's knife to cut deeply into an organ, thereby prematurely it would seem bringing this existence to an end for thousands of innocent individuals who cannot possibly see the "divine" reason; and a scientist among the cells would find no fault with the "natural" course of the catastrophe; the terrible wedge that brought the disaster, obeyed nothing but known natural laws. And so the parallel may go on almost *in infinitum*.

MONTCLAIR, NEW JERSEY.

J. E. FRIES.

#### PLATO'S "IDEA" AND ARISTOTLE'S "ENTELECHY."

Plato's "Idea" was in reality the idea of God, the Creator, and not of his finite creatures who in all their sciences, as Kepler and Agassiz truly say, "only think God's thoughts after Him." "Ideas" belonged before creation, to God's foreknowledge and foreordination.

Aristotle justly complained that Plato did not connect his "ideas" with actual things. This was the missing link, which undermined his philosophy. Only a personal God can connect fore-ordination with actual existence.

Aristotle "felt after," if he did not fully reach, God, in his doctrine of the Entelechy (*ἐντελέχεια*: the holding, or completing, *ἔχειν*, of the end, *τέλος*); i. e., the complete actualization of an existing thing by the fiat of God, as contrasted with the mere potential idea or possible existence of it in the foreknowledge and foreordination of God before the work of creation.

Both Plato and Aristotle were, like all men, limited and like all since Adam, fallen. Yet they were intellectual Titans, struggling like Hercules, to tear asunder the coils of the serpent which binds depravity. Both saw as through a glass darkly; saw men, as trees,

walking; yet saw the truth in part. Socrates thought if men *knew* the truth they would *do* duty. Plato knew they would not. They would approve of it but not do it; still they would have real ideas of truth and duty. Aristotle perceived that those ideas while they were in the air, would effect nothing; and that they must be made actual by a supernatural, super-human, super-finite Power, God. His doctrine of "the Entelechy" as the actualized substance of things, is perhaps the most advanced thought reached by man without Revelation. "The World by Wisdom knew not God," i. e., not adequately to meet its needs. You must search through all Greece, and through the whole world, said Socrates, for some Charmer to allay that fear, to meet that need which all men still feel, notwithstanding all that mere speculation can do for them. "I," said Christ, "am the Light of the World"; "I am the Way, the Truth and the Life." "Without shedding of blood is no remission of sin"; "Except a man be born again he can not see the kingdom of God"; "There is none other name under heaven given," etc. The "Charmer" of Socrates, Plato's supreme "Idea," Aristotle's ultimate "Entelechy," can be found, and found only, in Christ, in whom dwelt all the fulness of the Godhead bodily. He is Lord of all.

SAMUEL WARD BOARDMAN.

#### EDITORIAL COMMENT.

We take great pleasure in offering to our readers this article from the pen of the professor-emeritus of mental and moral philosophy, and former president of Maryville (Tenn.) College.

As the author states, it is "very brief but treats a very great subject." Our venerable correspondent declares in his letter: "We are, I suppose, at the antipodes in philosophy and theology, but on that account you are the more useful to me, as showing what those really hold whom I suppose to be wrong."

His kindly disposition appears in the following sentences: "Those who are commonly called 'orthodox,' are under rather more obligation than others, because they profess and claim more; even 'to hope all things, to believe all things, to endure all things.'"

We need not add that a combination of Plato and Aristotle will be broadening for both. At the same time we too believe in an entelechy, but the entelechy is immanent, not of an external kind. The world-order is not a design made after the fashion of a man-made plan, but it is an intrinsic direction which is such as it manifests itself for instance in evolution, and which can not be otherwise.



This is the meaning of the God-idea, and this leads to the ideal of the God-man as conceived in Asia under the title Buddha and in Europe under the name Christ. Perhaps, if we only take away the belief in the letter of Christian dogmas, we may be in better agreement than President Boardman thinks. Though we may be antipodes now I have held and cherished the views which he espouses, and I feel still at home among my antipodes.

P. C.

## A MAGIC CUBE OF SIX.

The two very interesting articles on Oddly-Even Magic Squares by Messrs. D. F. Savage and W. S. Andrews, which appeared in

4	139	161	26	174	147
85	166	107	188	93	12
98	152	138	3	103	157
179	17	84	165	184	22
183	21	13	175	89	170
102	156	148	94	8	143

1

193	58	80	215	39	66
112	31	134	53	120	201
125	71	57	192	130	76
44	206	111	30	49	211
48	210	202	40	116	35
129	75	67	121	197	62

2

18	153	136	163	23	158
99	180	1	82	104	185
181	19	95	176	171	9
100	154	149	14	90	144
167	5	108	189	172	10
86	140	162	27	91	145

3

207	72	55	28	212	77
126	45	190	109	131	50
46	208	122	41	36	198
127	73	68	203	117	63
32	194	135	54	37	199
113	59	81	216	118	64

4

155	20	150	15	169	142
101	182	96	177	88	7
6	87	106	187	92	173
141	168	160	25	11	146
151	16	137	83	105	153
97	178	2	164	186	24

5

74	209	69	204	34	61
128	47	123	42	115	196
195	114	133	52	119	38
60	33	79	214	200	65
70	205	56	110	132	78
124	43	191	29	51	213

6

Fig. 1.

the January number, might suggest the possibilities of extending those methods of construction into Nasik cubes. It is an interesting proposition and might lead to many surprising results.

Although the cube to be described here is not exactly of the nature mentioned above, it follows similar principles of construction and involves features quite unusual to cubes of this class.

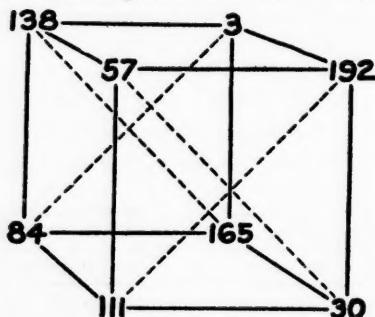


Fig. 2.

The six respective layers of this cube are shown in Fig. 1. All of its 108 columns, and its four oblique diagonals give the constant summation of 651. If we divide this into 27 smaller cubes, which we will call cubelets, of eight cells each, the six faces, and also two diagonal planes of any cubelet give constant summations. For example, we will note the central cubelet of the first and second layer, which is shown diagrammatically in Fig. 2. Its summations are as follows.

The six faces:

57	138	138	84	57	192
192	3	3	165	111	30
30	165	192	30	84	165
111	84	57	111	138	3
<hr/>					
390	390	390	390	390	390

The two diagonal planes:

57	192
30	111
165	84
138	3
<hr/>	
390	390

Also, if the sum of the eight cells in each of the cubelets be taken as a whole, we have a  $3 \times 3 \times 3$  cube with 37 summations, each amounting to 2604.

4	4	26	26	12	12
4	4	26	26	12	12
17	17	3	3	22	22
17	17	3	3	22	22
21	21	13	13	8	8
21	21	13	13	8	8

1

4	4	26	26	12	12
4	4	26	26	12	12
17	17	3	3	22	22
17	17	3	3	22	22
21	21	13	13	8	8
21	21	13	13	8	8

2

18	18	1	1	23	23
18	18	1	1	23	23
19	19	14	14	9	9
19	19	14	14	9	9
5	5	27	27	10	10
5	5	27	27	10	10

3

18	18	1	1	23	23
18	18	1	1	23	23
19	19	14	14	9	9
19	19	14	14	9	9
5	5	27	27	10	10
5	5	27	27	10	10

4

20	20	15	15	7	7
20	20	15	15	7	7
6	6	25	25	11	11
6	6	25	25	11	11
16	16	2	2	24	24
16	16	2	2	24	24

5

20	20	15	15	7	7
20	20	15	15	7	7
6	6	25	25	11	11
6	6	25	25	11	11
16	16	2	2	24	24
16	16	2	2	24	24

6

Fig. 3.

The construction of this cube is by La Hireian method, using two primary cubes, which are shown in Figs. 3 and 4. Fig. 3 contains 27 cubelets, each containing eight cells with eight equal numbers; the numbers in the respective cubelets ranking in order as the series, 1, 2, 3, ..., 27. These 27 cubelets are arranged according to

the methods of any  $3 \times 3 \times 3$  cube. This gives us a primary cube with all the features of the final cube.

Fig. 4 is also divided into 27 cubelets, each of which must contain the series 0, 27, 54, 81, 108, 135, 162, 189. The arrangement of the numbers in these 27 cubelets must be such as will give the

0	5	5	0	6	5
3	6	3	6	3	0
3	5	5	0	3	5
6	0	3	6	6	0
6	0	0	6	3	6
3	5	5	3	0	5

1

7	2	2	7	1	2
4	1	4	1	4	7
4	2	2	7	4	2
1	7	4	1	1	7
1	7	7	1	4	1
4	2	2	4	7	2

2

0	5	5	6	0	5
3	6	0	3	3	6
6	0	3	6	6	0
3	5	5	0	3	5
6	0	3	6	6	0
3	5	5	0	3	5

3

7	2	2	1	7	2
4	1	7	4	4	1
1	7	4	1	1	7
4	2	2	7	4	2
1	7	4	1	1	7
4	2	2	7	4	2

4

5	0	5	0	6	5
3	6	3	6	3	0
0	3	3	6	3	6
5	6	5	0	0	5
5	0	5	3	3	5
3	6	0	6	6	0

5

2	7	2	7	1	2
4	1	4	1	4	7
7	4	4	1	4	1
2	1	2	7	7	2
2	7	2	4	4	2
4	1	7	1	1	7

6

Fig. 4.

primary cube all the required features of the final cube. The eight numbers of the cubelet series are, for convenience, divided by 27, and give the series 0, 1, 2, 3, 4, 5, 6, 7, which can easily be brought back to the former series after the primary cube is constructed.

To construct the cubelet, we divide the above series into two sets of four numbers each, so that the sums of the two sets are equal, and the complementaries of one set are found in the other. This division is 0, 5, 6, 3 and 7, 2, 1, 4, which separates the complementaries and gives two sets, each amounting to 14. We can place one set in any desired order on one face, and it only remains to place the four complementaries in the opposite face, so that the four lines connecting complementary pairs are parallel.

These cubelets are arranged in the primary cube with the 0, 5, 6, 3 faces placed in the 1st, 3d, and 5th layers, and the 7, 2, 1, 4 faces placed in the 2d, 4th, and 6th layers, which arrangement satisfies the summations perpendicular to the layers.

It now remains to adjust the pairs in the cubelets to suit the summations in the layers and the four diagonals. We first arrange the pairs that will give the diagonal summations, and by doing so, we set the position of four numbers in each of the layers 3 and 4, and eight numbers in each of the layers 1, 2, 5 and 6. We then arrange the remaining numbers in the layers 1, 3 and 5 to suit the twelve summations of each layer, which consequently locates the numbers for layers 2, 4 and 6, since complementary pairs must lie perpendicularly to the cubes layers. This gives us a primary cube such as that shown in Fig. 4.

The numbers in each cell of Fig. 4 must then be multiplied by 27, and added to the respective cells in Fig. 3, which combination gives us the final cube shown in Fig. 1.

HARRY A. SAYLES.

SCHENECTADY, N. Y.

### MAGIC CUBE ON SIX.

FIRST OR TOP SQUARE.

106	8	7	212	209	109
199	116	113	16	12	195
196	114	115	11	15	200
21	203	202	103	100	22
17	205	208	99	104	18
112	5	6	210	211	107

SECOND SQUARE.

166	130	129	32	30	164
37	152	148	137	143	34
33	151	150	142	140	35
128	41	47	157	154	124
126	46	44	155	153	127
161	131	133	28	31	167

THIRD SQUARE.

163	135	136	25	27	165
36	145	149	144	138	39
40	146	147	139	141	38
121	48	42	156	159	125
123	43	45	158	160	122
168	134	132	29	26	162

FOURTH SQUARE.

55	192	191	83	81	49
93	60	57	176	174	91
89	62	63	172	175	90
182	74	77	70	65	183
180	75	73	68	71	184
52	188	190	82	85	54

FIFTH SQUARE.

50	185	186	86	88	56
92	61	64	169	171	94
96	59	58	173	170	95
179	79	76	67	72	178
181	78	80	69	66	177
53	189	187	87	84	51

SIXTH OR BOTTOM SQUARE.

111	1	2	213	216	108
194	117	120	9	13	198
197	119	118	14	10	193
20	206	207	98	101	19
24	204	201	102	97	23
105	4	3	215	214	110

In the cube, whose horizontal squares are here shown, the sum of each of the normal rows (those perpendicular to the faces of the cube) is 651, and the sum of each of the sixteen diagonals connecting the corners of the cube is the same.

These diagonals include the entire diagonals of the surfaces of the cube and the four diagonals of the solid running from corner to corner through the center of the cube.

DIAGONALS.

Top Square.	106	116	115	103	104	107
	109	12	11	202	205	112
Bottom Square.	111	117	118	98	97	110
	108	13	14	207	204	105

Front Square.	112	131	132	82	84	110
	107	31	29	190	189	105
Rear Square.	106	130	136	83	88	108
	109	30	25	191	185	111
Left Square.	106	37	40	182	181	105
	112	126	121	89	92	111
Right Square.	109	34	38	183	177	110
	107	127	125	90	94	108
Diagonals of the Solid.	106	152	147	70	66	110
	109	143	139	77	78	105
	107	153	156	63	61	111
	112	46	42	172	171	108

The foregoing cube was constructed in the following manner.

The foundation of this construction is the cube on 3 which is shown in the following squares.

FIRST OR TOP SQUARE	SECOND OR MIDDLE SQUARE.	THIRD OR BOTTOM SQUARE																											
<table border="1"> <tr><td>19</td><td>5</td><td>18</td></tr> <tr><td>17</td><td>21</td><td>4</td></tr> <tr><td>6</td><td>16</td><td>20</td></tr> </table>	19	5	18	17	21	4	6	16	20	<table border="1"> <tr><td>15</td><td>25</td><td>2</td></tr> <tr><td>1</td><td>14</td><td>27</td></tr> <tr><td>26</td><td>3</td><td>13</td></tr> </table>	15	25	2	1	14	27	26	3	13	<table border="1"> <tr><td>8</td><td>12</td><td>22</td></tr> <tr><td>24</td><td>7</td><td>11</td></tr> <tr><td>10</td><td>23</td><td>9</td></tr> </table>	8	12	22	24	7	11	10	23	9
19	5	18																											
17	21	4																											
6	16	20																											
15	25	2																											
1	14	27																											
26	3	13																											
8	12	22																											
24	7	11																											
10	23	9																											

The sum of each normal row in the above cube, whether running from left to right, from rear to front or from top to bottom, is 42; and the sum of each diagonal of which the central term 14 is a member, as 19 14 9, 5 14 23, 15 14 13, etc., is also 42.

Deduct 1 from each term of the above cube and multiply the remainder by 8. With each of these multiples construct a cubic group consisting of eight repetitions of the multiple. Substitute each of these groups for that term of the cube from which it was derived, and the result will be a cube with six terms in each row. The horizontal squares of this cube are shown in the following figures, the second square being the same as the first, the fourth as the third, and the sixth as the fifth.



## BASIC CUBE.

FIRST, OR TOP, AND SECOND SQUARES.

144	144	32	32	136	136
144	144	32	32	136	136
128	128	160	160	24	24
128	128	160	160	24	24
40	40	120	120	152	152
40	40	120	120	152	152

THIRD AND FOURTH SQUARES.

112	112	192	192	8	8
112	112	192	192	8	8
0	0	104	104	208	208
0	0	104	104	208	208
200	200	16	16	96	96
200	200	16	16	96	96

FIFTH AND SIXTH SQUARES.

56	56	88	88	168	168
56	56	88	88	168	168
184	184	48	48	80	80
184	184	48	48	80	80
72	72	176	176	64	64
72	72	176	176	64	64

## THE BASIC CUBE.

The sum of the terms in each normal row of the preceding cube is 624, and the sum of each diagonal which includes two terms from the central group of the cube is also 624. It follows that the middle two squares in each normal direction are magical and that each diagonal of the solid has the same sum as the normal rows. This cube is called the *basic* cube.

## THE GROUP CUBE.

Another magic cube with six terms in each row was next constructed. This cube is called the *group* cube. Each position which in the basic cube is occupied by a cubic group of eight equal numbers is occupied in the group cube by a cubic group consisting of the numbers 1, 2, 3, 4, 5, 6, 7, 8. All of the rows and diagonals

which have equal sums in the basic cube will have equal sums in the group cube.

## THE GROUP CUBE.

FIRST OR TOP SQUARE.

3	2	8	6	5	3
5	1	4	7	2	8
8	7	3	5	3	1
4	6	8	2	2	5
5	3	3	2	8	6
2	8	1	5	7	4

SECOND SQUARE.

6	7	1	3	4	6
4	8	5	2	7	1
1	2	6	4	6	8
5	3	1	7	7	4
4	6	6	7	1	3
7	1	8	4	2	5

THIRD SQUARE.

3	2	4	8	7	3
1	4	7	3	4	8
7	8	2	5	1	4
6	5	8	3	3	2
8	5	1	2	8	3
2	3	5	6	4	7

FOURTH SQUARE.

6	7	5	1	2	6
8	5	2	6	5	1
2	1	7	4	8	5
3	4	1	6	6	7
1	4	8	7	1	6
7	6	4	3	5	2

FIFTH SQUARE.

2	3	8	7	2	5
8	5	4	6	3	1
2	1	2	8	8	6
3	5	5	3	4	7
8	6	5	1	2	5
4	7	3	2	8	3

SIXTH OR BOTTOM SQUARE.

7	6	1	2	7	4
1	4	5	3	6	8
7	8	7	1	1	3
6	4	4	6	5	2
1	3	4	8	7	4
5	2	6	7	1	6

## THE COMPLETE CUBE.

Adding together the terms which occupy corresponding positions in the basic cube and the group cube the result is the complete cube shown below which contains the numbers from 1 to  $6^3 = 216$ .

## THE COMPLETE CUBE.

FIRST OR TOP SQUARE.

147	146	40	38	141	139
149	145	36	39	138	144
136	135	163	165	27	25
132	134	168	162	26	29
45	43	123	122	160	158
42	48	121	125	159	156

SECOND SQUARE.

150	151	33	35	140	142
148	152	37	34	143	137
129	130	166	164	30	32
133	131	161	167	31	28
44	46	126	127	153	155
47	41	128	124	154	157

THIRD SQUARE.

115	114	196	200	15	11
113	116	199	195	12	16
7	8	106	109	209	212
6	5	112	107	211	210
208	205	17	18	104	99
202	203	21	22	100	103

FOURTH SQUARE.

118	119	197	193	10	14
120	117	194	198	13	9
2	1	111	108	216	213
3	4	105	110	214	215
201	204	24	23	97	102
207	206	20	19	101	98

FIFTH SQUARE.

58	59	96	95	170	173
64	61	92	94	171	169
186	185	50	56	88	86
187	189	53	51	84	87
80	78	181	177	66	69
76	79	179	178	72	67

SIXTH OR BOTTOM SQUARE.

63	62	89	90	175	172
57	60	93	91	174	176
191	192	55	49	81	83
190	188	52	54	85	82
73	75	180	184	71	68
77	74	182	183	65	70

## THE FINAL CUBE.

In the complete cube, just given, the middle two squares in each direction are magical while the outer squares are not.

To bring these magical squares to the surface the squares of each set of parallel squares may be permuted as follows:

Original order .....1, 2, 3, 4, 5, 6,  
Permuted order .....3, 2, 1, 6, 5, 4.

The result is the final cube shown in the beginning of this article.

The above permutation is subject to two conditions. The several sets of parallel squares must all be permuted in the same manner. Any two parallel squares which in the original cube are located on opposite sides of the middle plane of the cube and at an equal distance from it, in the permuted cube must be located on opposite sides of the middle plane of the cube and at an equal distance from it. These conditions are for the protection of the diagonals.

JOHN WORTHINGTON.

### MAGIC IN THE FOURTH DIMENSION.

Definition of terms: *Row* is a general term; *rank* denotes a horizontal right-to-left row; *file* a row from front to back; and *column* a vertical row in a cube—not used of any horizontal dimension.

If  $n^2$  numbers of a given series can be grouped so as to form a magic square and  $n$  such squares be so placed as to constitute a magic cube, why may we not go a step further and group  $n$  cubes in relations of the fourth dimension? In a magic square containing the natural series  $1 \dots n^2$  the summation is  $\frac{n(n^2+1)}{2}$ ; in a magic cube with the series  $1 \dots n^3$  it is  $\frac{n(n^3+1)}{2}$ ; and in an analogous fourth-dimension construction it naturally will be  $\frac{n(n^4+1)}{2}$ .

With this idea in mind I have made some experiments, and the results are interesting. The analogy with squares and cubes is not perfect, for rows of numbers can be arranged side by side to represent a visible square, squares can be piled one upon another to make a visible cube, but cubes cannot be so combined in drawing as to picture to the eye their higher relations. My expectation *a priori* was that some connection or relation, probably through some form of diagonal-of-diagonal, would be found to exist between the cubes containing the  $n^4$  terms of a series. This particular feature did appear in the cases where  $n$  was odd. Here is how it worked out:

#### I. When $n$ is odd.

1. Let  $n=3$ , then  $S=123$ .—The natural series  $1 \dots 81$  was divided into three sub-series such that the sum of each would be

one-third the sum of the whole. In dealing with any such series when  $n$  is odd there will be  $n$  sub-series, each starting with one of the first  $n$  numbers, and the difference between successive terms will be  $n+1$ , except after a multiple of  $n$ , when the difference is 1. In the present case the three sub-series begin respectively with 1, 2, 3, and the first is 1 5 9 10 14 18 19 23 27 28 32 36 37 41 45 46 50 54 55 59 63 64 68 72 73 77 81. These numbers were arranged in three squares constituting a magic cube, and the row of squares so formed was flanked on right and left by similar rows formed from the other two sub-series (see Fig. 1).

It is not easy—perhaps it is not possible—to make an absolutely perfect cube of 3. These are not perfect, yet they have many

I			II			III		
25	38	60	28	77	18	67	8	48
33	79	11	72	1	50	21	40	62
65	6	52	23	45	55	35	75	13
29	78	16	68	9	46	26	39	58
70	2	51	19	41	63	31	80	12
24	43	56	36	73	14	66	4	53
69	7	47	27	37	59	30	76	17
20	42	61	32	81	10	71	3	49
34	74	15	64	5	54	22	44	57

Fig. 1. (3')

striking features. Taking the three cubes separately we find that in each all the "straight" dimensions—rank, file and column—have the proper footing, 123. In the middle cube there are two plane diagonals having the same summation, and in cubes I and III one each. In cube II four cubic diagonals and four diagonals of vertical squares are correct; I and III each have one cubic diagonal and one vertical-square diagonal.

So much for the original cubes; now for some combinations. The three squares on the diagonal running down from left to right will make a magic cube with rank, file, column, cubic diagonals, two plane diagonals and four vertical-square diagonals (37 in all) correct. Two other cubes can be formed by starting with the top squares of II and III respectively and following the "broken diag-

onals" running downward to the right. In each of these S occurs at least 28 times (in 9 ranks, 9 files, 9 columns and one cubic diagonal). Various other combinations may be found by taking the squares together in horizontal rows and noting how some columns and assorted diagonals have the proper summation, but the most important and significant are those already pointed out. In all the sum 123 occurs over 200 times in this small figure.

I									II									III									IV									V								
317	473	604	10	161	192	318	479	510	36	67	223	354	385	536	567	98	229	260	411	442	598	104	135	286																				
110	136	292	448	570	610	11	167	323	454	485	511	42	108	329	360	386	542	73	204	235	261	417	573	79																				
423	554	85	236	267	298	429	585	111	142	173	304	460	611	17	48	179	335	486	517	548	54	210	361	392																				
211	367	398	529	60	86	242	273	404	560	586	117	148	279	435	461	617	23	154	310	336	492	523	29	185																				
504	35	186	342	498	379	535	61	217	373	254	410	561	92	248	129	285	436	502	123	4	160	311	467	623																				
606	12	168	324	455	381	512	43	199	330	356	387	543	74	205	231	262	418	574	80	106	137	293	449	580																				
299	430	581	112	143	174	305	456	612	18	49	180	331	487	518	549	55	206	362	393	424	555	81	237	268																				
87	243	274	405	556	587	118	149	280	431	462	618	24	155	306	337	493	524	30	181	212	368	399	530	56																				
380	531	62	218	374	255	406	562	93	249	130	281	437	593	124	5	156	312	468	624	505	31	187	343	409																				
193	349	480	506	37	68	224	355	381	537	568	99	230	256	412	443	599	105	131	287	318	474	605	6	162																				
175	301	457	613	19	50	176	332	488	519	550	51	207	363	394	425	551	82	238	269	300	426	582	113	144																				
588	119	150	276	432	463	610	25	151	307	338	494	525	26	182	213	369	400	526	57	88	244	275	401	557																				
251	107	563	94	250	126	282	438	594	125	1	157	313	469	625	501	32	188	344	500	376	532	63	219	375																				
69	225	351	382	538	569	100	226	257	413	444	600	101	132	288	319	475	601	7	163	104	350	476	507	38																				
482	513	44	200	326	357	388	544	75	201	232	263	419	575	76	107	138	294	450	576	607	13	169	325	451																				
464	620	21	152	308	339	495	521	27	183	214	370	396	527	58	89	245	271	402	558	589	120	146	277	433																				
127	283	439	595	121	2	158	314	470	621	502	33	189	345	496	377	533	64	220	371	252	408	564	95	246																				
570	96	227	258	414	445	596	102	133	289	320	471	602	8	164	195	346	477	508	39	79	221	352	383	539																				
358	389	545	71	202	233	264	420	571	77	108	139	295	446	577	608	14	170	321	452	483	514	45	196	327																				
46	177	313	489	520	546	52	208	364	395	421	552	83	239	270	296	427	583	114	145	171	302	458	614	20																				
3	159	315	466	622	593	34	190	341	497	378	534	65	216	372	253	409	565	91	247	128	284	440	591	122																				
441	597	103	134	290	316	472	603	9	165	191	347	478	509	40	66	222	353	384	540	566	97	288	259	415																				
234	265	416	572	78	109	140	291	447	578	609	15	166	322	453	484	515	41	197	328	359	390	541	72	203																				
547	53	209	365	391	422	553	84	240	266	297	428	584	115	141	172	303	459	615	16	47	178	334	499	516																				
340	491	522	28	184	215	366	397	528	59	90	241	272	403	559	590	116	147	278	434	465	616	22	153	309																				

Fig. 2. (5<sup>4</sup>)

One most interesting fact remains to be noticed. While the three cubes were constructed separately and independently the figure formed by combining them is an absolutely perfect square of 9, with a summation of 369 in rank, file and corner diagonal (besides all "broken" diagonals running downward to the right), and a perfect

balancing of complementary numbers about the center. Any such pair, taken with the central number 41, gives us the familiar sum 123, and this serves to bind the whole together in a remarkable manner.

2. Let  $n=5$ , then  $S=1565$ .—In Fig. 2 is represented a group of 5-cubes each made up of the numbers in a sub-series of the natural series 1...625. In accordance with the principle stated in a previous paragraph the central sub-series is 1 7 13 19 25 26 32 ... 625, and the other four can easily be discovered by inspection. Each of the twenty-five small squares has the summation 1565 in rank, file, corner diagonal and broken diagonals, twenty times altogether in each square, or 500 times for all.

Combining the five squares in col. I we have a cube in which all the 75 "straight" rows (rank, file and vertical column), all the horizontal diagonals and three of the four cubic diagonals foot up 1565. In cube III all the cubic diagonals are correct. Each cube also has seven vertical-square diagonals with the same summation. Taking together the squares in horizontal rows we find certain diagonals having the same sum, but the columns do not. The five squares in either diagonal of the large square, however, combine to produce almost perfect cubes, with rank, file, column and cubic diagonals all correct, and many diagonals of vertical squares.

A still more remarkable fact is that the squares in the broken diagonals running in either direction also combine to produce cubes as nearly perfect as those first considered. Indeed, the great square seems to be an enlarged copy of the small squares, and where the cells in the small ones unite to produce  $S$  the corresponding squares in the large figure unite to produce cubes more or less perfect. Many other combinations are discoverable, but these are sufficient to illustrate the principle, and show the interrelations of the cubes and their constituent squares. The summation 1565 occurs in this figure not less than 1400 times.

The plane figure containing the five cubes (or twenty-five squares) is itself a perfect square with a summation of 7825 for every rank, file, corner or broken diagonal. Furthermore all complementary pairs are balanced about the center, as in Fig. 1. Any square group of four, nine or sixteen of the small squares is magic, and if the group of nine is taken at the center it is "perfect." It is worthy of notice that all the powers of  $n$  above the first lie in the middle rank of squares, and that all other multiples of  $n$  are grouped in regular relations in the other ranks and have the same

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grouping in all the squares of any given rank. The same is true of the figure illustrating  $7^4$ , which is to be considered next.

3. Let  $n=7$ , then  $S=8407$ .—This is so similar in all its properties to the 5-construction just discussed that it hardly needs separate description. It is more nearly perfect in all its parts than the  $5^4$ , having a larger proportion of its vertical-square diagonals correct. Any square group of four, nine, sixteen, twenty-five or thirty-six small squares is magic, and if the group of nine or twenty-five

I				II				III				IV			
1	255	254	4	248	10	11	245	240	18	19	237	25	231	230	28
252	6	7	249	13	243	242	16	21	235	234	24	228	30	31	225
8	250	251	5	241	15	14	244	233	23	22	236	32	226	227	29
253	3	2	256	12	246	247	9	20	238	239	17	229	27	26	232
224	34	35	221	41	215	214	44	49	207	206	52	200	58	59	197
37	219	218	40	212	46	47	209	204	54	55	201	61	195	194	64
217	39	38	220	48	210	211	45	56	202	203	53	193	63	62	196
36	222	223	33	213	43	42	216	205	51	50	208	60	198	199	57
192	66	67	189	73	183	182	76	81	175	174	84	168	90	91	165
69	187	186	72	180	78	79	177	172	86	87	169	93	163	162	96
185	71	70	188	80	178	179	77	88	170	171	85	161	95	94	164
68	190	191	65	181	75	74	184	173	83	82	176	92	166	167	89
97	159	158	100	152	106	107	149	144	114	115	141	121	135	134	124
156	102	103	153	109	147	146	112	117	139	138	120	132	126	127	129
104	154	155	101	145	111	110	148	137	119	118	140	128	130	131	125
157	99	98	160	108	150	151	105	116	142	143	113	133	123	122	136

Fig. 3. ( $4^4$ )

be taken at the center of the figure it is "perfect." The grouping of multiples and powers of  $n$  is very similar to that already described for  $5^4$ .

## II. When $n$ is even.

I. Let  $n=4$ , then  $S=514$ .—The numbers may be arranged in either of two ways. If we take the diagram for the 4-cube as

I

II

III

1	1295	1294	3	1292	6	1278	20	21	1276	23	1273	37	1259	1258	39	1256	42
1290	8	1288	1287	11	7	25	1271	27	28	1268	1272	1254	44	1252	1251	47	43
1284	1283	15	16	14	1279	31	32	1264	1263	1265	36	1248	1247	51	52	50	1243
13	17	1281	1282	1280	18	1266	1262	34	33	35	1261	49	53	1245	1246	1244	54
12	1286	9	10	1289	1285	1267	29	1270	1269	26	30	48	1250	45	46	1253	1249
1291	2	4	1293	5	1296	24	1277	1275	22	1274	19	1255	38	40	1257	41	1260
1188	110	111	1186	113	1183	127	1169	1168	129	1166	132	1152	146	147	1150	149	1147
115	1181	117	118	1178	1182	1164	134	1162	1161	137	133	151	1145	153	154	1142	1146
121	122	1174	1173	1175	126	1158	1167	141	142	140	1153	157	158	1138	1137	1139	162
1176	1172	124	123	125	1171	139	143	1155	1156	1154	144	1140	1136	160	159	161	1135
1177	119	1180	1179	116	120	138	1160	135	136	1163	1159	1141	155	1144	1143	152	156
114	1187	1185	112	1184	109	1165	128	130	1167	131	1170	150	1151	1149	148	1148	145
217	1079	1078	219	1076	222	1062	236	237	1060	239	1057	253	1043	1042	255	1040	258
1074	224	1072	1071	227	223	241	1055	243	244	1052	1056	1038	260	1036	1035	263	259
1068	1067	231	232	230	1063	247	248	1048	1047	1049	252	1032	1031	267	268	266	1027
229	233	1065	1066	1064	234	1050	1046	250	249	251	1045	265	269	1029	1030	1028	270
228	1070	225	226	1073	1069	1051	245	1054	1053	242	246	264	1034	261	262	1037	1033
1075	218	220	1077	221	1080	240	1061	1059	238	1058	235	1039	254	256	1041	257	1044
865	431	430	867	428	870	414	884	885	412	887	409	901	395	394	903	392	906
426	872	424	423	875	871	889	407	891	892	404	408	390	908	388	387	911	907
420	419	879	880	878	415	895	896	400	399	401	900	384	383	915	916	914	379
877	881	417	418	416	882	402	398	898	897	899	397	913	917	381	382	380	918
876	422	873	874	425	421	403	893	406	405	890	894	912	386	909	910	389	385
427	866	868	429	869	432	888	413	411	886	410	883	391	902	904	393	905	396
864	434	435	862	437	859	451	845	844	453	842	456	828	470	471	826	473	823
439	857	441	442	854	858	840	458	838	837	461	457	475	821	477	478	818	822
445	446	850	849	851	450	834	833	465	466	464	829	481	482	814	813	815	486
852	848	448	447	449	847	463	467	831	832	830	468	816	812	484	483	485	811
853	443	856	855	440	444	462	836	459	460	839	835	817	479	820	819	476	480
438	863	861	436	860	433	841	452	454	843	455	846	474	827	825	472	824	469
756	542	543	754	545	751	559	737	736	561	734	564	720	578	579	718	581	715
547	749	549	550	746	750	732	566	730	729	569	565	583	713	585	586	710	714
553	554	742	741	743	558	726	725	573	574	572	721	589	590	706	705	707	594
744	740	556	555	557	739	571	575	723	724	722	576	708	704	592	591	593	703
745	551	748	747	548	552	570	728	567	568	731	727	709	587	712	711	584	588
546	755	753	544	752	541	733	560	562	735	563	738	582	719	717	580	716	577

Fig. 4, First Part. ( $6^4S=3891$ )

IV

V

VI

1225	71	70	1227	68	1230	1224	74	75	1222	77	1219	1206	92	93	1204	95	1201
66	1232	64	63	1235	1231	79	1217	81	82	1214	1218	97	1199	99	100	1196	1200
60	59	1239	1240	1238	55	85	86	1210	1209	1211	90	103	104	1192	1191	1193	108
1237	1241	57	58	56	1242	1212	1208	88	87	89	1207	1194	1190	106	105	107	1189
1236	62	1233	1234	65	61	1213	83	1216	1215	80	84	1195	101	1198	1197	98	102
67	1226	1228	69	1229	72	78	1223	1221	76	1220	73	96	1205	1203	94	1202	91
180	1118	1119	178	1121	175	181	1115	1114	183	1112	186	199	1007	1096	201	1094	204
1123	173	1125	1126	170	174	1110	188	1108	1107	191	187	1092	206	1090	1089	209	205
1129	1130	166	165	167	1134	1104	1103	195	196	194	1099	1086	1085	213	214	212	1081
168	164	1132	1131	1133	163	193	197	1101	1102	1100	198	211	215	1083	1084	1082	216
169	1127	172	171	1124	1128	192	1106	189	190	1109	1105	210	1088	207	208	1091	1087
1122	179	177	1120	176	1117	1111	182	184	1113	185	1116	1093	200	202	1095	203	1098
1009	287	286	1011	284	1014	1008	290	291	1006	293	1003	990	308	309	988	311	985
282	1016	280	279	1019	1015	295	1001	297	298	998	1002	313	983	315	316	980	984
276	275	1023	1024	1022	271	301	302	994	993	995	306	319	320	976	975	977	324
1021	1025	273	274	272	1026	996	992	304	303	305	991	978	974	322	321	323	973
1020	278	1017	1018	281	277	997	299	1000	999	296	300	979	317	982	981	314	318
283	1010	1012	285	1013	288	294	1007	1005	292	1004	289	312	989	987	310	986	307
361	935	934	363	932	366	360	938	939	358	941	355	342	956	957	340	959	337
930	368	928	927	371	367	943	353	945	946	350	354	961	335	963	964	332	336
944	923	375	376	374	919	949	950	346	345	347	954	967	968	328	327	329	972
373	377	921	922	920	378	348	344	952	951	953	343	330	326	970	969	971	325
372	926	369	370	929	925	349	947	352	351	944	948	331	965	334	333	962	966
931	362	364	933	365	936	942	359	357	940	356	937	960	341	339	958	338	955
504	794	795	502	797	499	505	791	790	507	788	510	523	773	772	525	770	528
799	497	801	802	494	498	786	512	784	783	515	511	768	530	766	765	533	529
805	806	490	489	491	810	780	779	519	520	518	775	762	761	537	538	536	757
492	488	808	807	809	487	517	521	777	778	776	522	535	539	759	760	758	540
493	803	496	495	800	804	516	782	513	514	785	781	534	764	531	532	767	763
798	503	501	796	500	793	787	506	508	789	509	792	769	524	526	771	527	774
612	686	687	610	689	607	613	683	682	615	680	618	631	665	664	633	662	636
691	605	693	694	602	606	678	620	676	675	623	619	660	638	658	657	641	637
697	698	598	597	599	702	672	671	627	628	626	667	654	653	645	646	644	649
600	596	700	699	701	595	625	629	669	670	668	630	643	647	651	652	650	648
601	695	604	603	692	696	624	674	621	622	677	673	642	656	639	640	659	655
690	611	609	688	608	685	679	614	616	681	617	684	661	632	634	663	635	666

Fig. 4, Second Part. ( $6^{\circ}:S=3891$ )

given in *Magic Squares and Cubes* and simply extend it to cover the larger numbers involved we shall have a group of four cubes in which all the "straight" dimensions have  $S=514$ , but no diagonals except the four cubic diagonals. Each horizontal row of squares will produce a cube having exactly the same properties as those in the four vertical rows. If the four squares in either diag-

I

III

I	4095	4094	4	5	4091	4090	8	4032	66	67	4029	4028	70	71	4025
4088	10	11	4085	4084	14	15	4081	73	4023	4022	76	77	4019	4018	80
4080	18	19	4077	4076	22	23	4073	81	4015	4014	84	85	4011	4010	88
25	4071	4070	28	29	4067	4066	32	4008	90	91	4005	4004	94	95	4001
4065	31	30	4068	4069	27	26	4072	96	4002	4003	93	92	4006	4007	89
24	4074	4075	21	20	4078	4079	17	4009	87	86	4012	4013	83	82	4016
16	4082	4083	13	12	4086	4087	9	4017	79	78	4020	4021	75	74	4024
4089	7	6	4092	4093	3	2	4096	72	4026	4027	69	68	4030	4031	65
4064	34	35	4061	4060	38	39	4057	97	3999	3998	100	101	3995	3994	104
41	4055	4054	44	45	4051	4050	48	3992	106	107	3989	3988	110	111	3985
49	4047	4046	52	53	4043	4042	56	3984	114	115	3981	3980	118	119	3977
4040	58	59	4037	4036	62	63	4033	121	3975	3974	124	125	3971	3970	128
64	4034	4035	61	60	4038	4039	57	3969	127	126	3972	3973	123	122	3976
4041	55	54	4044	4045	51	50	4048	120	3978	3979	117	116	3982	3983	113
4049	47	46	4052	4053	43	42	4056	112	3986	3987	109	108	3990	3991	105
40	4058	4059	37	36	4062	4063	33	3993	103	102	3996	3997	99	98	4000

II

IV

Fig. 5, 8<sup>4</sup>, First Part (One cube written).

onal of the figure be piled together neither vertical columns nor cubic diagonals will have the correct summation, but all the diagonals of vertical squares in either direction will. Regarding the whole group of sixteen squares as a plane square we find it magic, having the summation 2056 in every rank, file and corner diagonal, 1028

in each half-rank or half-file, and 514 in each quarter-rank or quarter-file. Furthermore all complementary pairs are balanced about the center.

The alternative arrangement shown in Fig. 3 makes each of the small squares perfect in itself, with every rank, file and corner diagonal footing up 514 and complementary pairs balanced about the

V

VII

3968	130	131	3965	3964	134	135	3961	193	3903	3902	196	197	3899	3898	200
137	3959	3958	140	141	3955	3954	144	3896	202	203	3893	3892	206	207	3889
145	3951	3950	148	149	3947	3946	152	3888	210	211	3885	3884	214	215	3881
3944	154	155	3941	3940	158	159	3937	217	3879	3878	220	221	3875	3874	224
160	3938	3939	157	156	3942	3943	153	3873	223	222	3876	3877	219	218	3880
3945	151	150	3948	3949	147	146	3952	216	3882	3883	213	212	3886	3887	209
3953	143	142	3956	3957	139	138	3960	208	3890	3891	205	204	3894	3895	201
136	3962	3963	133	132	3966	3967	129	3897	199	198	3900	3901	195	194	3904
161	3935	3934	164	165	3931	3930	168	3872	226	227	3869	3868	230	231	3865
3928	170	171	3925	3924	174	175	3921	233	3863	3862	236	237	3859	3858	240
3920	178	179	3917	3916	182	183	3913	241	3855	3854	244	245	3851	3850	248
185	3911	3910	188	189	3907	3906	192	3848	250	251	3845	3844	254	255	3841
3905	191	190	3908	3909	187	186	3912	256	3842	3843	253	252	3846	3847	249
184	3914	3915	181	180	3918	3919	177	3849	247	246	3852	3853	243	242	3856
176	3922	3923	173	172	3926	3927	169	3857	239	238	3860	3861	235	234	3864
3929	167	166	3932	3933	163	162	3936	232	3866	3867	229	228	3870	3871	225

VI

VIII

Fig. 5, 8<sup>2</sup>, Second Part (One cube written).

center. As in the other arrangement the squares in each vertical or horizontal row combine to make cubes whose "straight" dimensions all have the right summation. In addition the new form has the two plane diagonals of each original square (eight for each cube), but sacrifices the four cubic diagonals in each cube. In lieu

of these we find a complete set of "bent diagonals" ("Franklin") like those described for the magic cube of six in *The Monist* for July, 1909.

If the four squares in either diagonal of the large figure be piled up it will be found that neither cubic diagonal nor vertical column is correct, but that all diagonals of vertical squares facing toward front or back are. Taken as a plane figure the whole group makes up a magic square of 16 with the summation 2056 in every rank, file or corner diagonal, half that summation in half of each of those dimensions, and one-fourth of it in each quarter dimension.

2. Let  $n=6$ , then  $S=3891$ .—With the natural series 1...1296 squares were constructed which combined to produce the six magic cubes of six indicated by the Roman numerals in Fig. 4. These have all the characteristics of the 6-cube described in *The Monist* of July last—108 "straight" rows, 12 plane diagonals and 24 "bent" diagonals in each cube, with the addition of 32 vertical-square diagonals if the squares are piled in a certain order. A seventh cube with the same features is made by combining the squares in the lowest horizontal row—i. e., the bottom squares of the numbered cubes. The feature of the cubic bent diagonals is found on combining any three of the small squares, no matter in what order they are taken. In view of the recent discussion of this cube it seems unnecessary to give any further account of it now.

The whole figure, made up as it is of thirty-six magic squares, is itself a magic square of 36 with the proper summation (23346) for every rank, file and corner diagonal, and the corresponding fractional part of that for each half, third or sixth of those dimensions. Any square group of four, nine, sixteen or twenty-five of the small squares will be magic in all its dimensions.

3. Let  $n=8$ , then  $S=16388$ .—The numbers 1...4096 may be arranged in several different ways. If the diagrams in Mr. Andrews's book be adopted we have a group of eight cubes in which rank, file, column and cubic diagonal are correct (and in which the halves of these dimensions have the half summation), but all plane diagonals are irregular. If the plan be adopted of constructing the small squares of complementary couplets, as in the 6-cube, the plane diagonals are equalized at the cost of certain other features. I have used therefore a plan which combines to some extent the advantages of both the others.

It will be noticed that each of the small squares in Fig. 5 is

perfect in that it has the summation 16388 for rank, file and corner diagonal (also for broken diagonals if each of the separated parts contain two, four or six—not an odd number of cells), and in balancing complementary couplets. When the eight squares are piled one upon the other a cube results in which rank, file, column, the plane diagonals of each horizontal square, the four ordinary cubic diagonals and 32 cubic bent diagonals all have  $S=16388$ . What is still more remarkable, the *half* of each of the “straight” dimensions and of each cubic diagonal has half that sum. Indeed this cube of eight can be sliced into eight cubes of 4 in each of which every rank, file, column and cubic diagonal has the footing 8194; and each of these 4-cubes can be subdivided into eight tiny 2-cubes in each of which the eight numbers foot up 16388.

So much for the features of the single cube here presented. As a matter of fact only the one cube has actually been written out. The plan of its construction, however, is so simple and the relations of numbers so uniform in the powers of 8 that it was easy to investigate the properties of the whole  $8^4$  scheme without having the squares actually before me. I give here the initial number of each of the eight squares in each of the eight cubes, leaving it for some one possessed of more leisure to write them all out and verify my statements as to the intercubical features. It should be remembered that in each square the number diagonally opposite the one here given is its complement, i. e., the number which added to it will give the sum 4097.

I	II	III	IV	V	VI	VII	VIII
I	3840	3584	769	3072	1281	1537	2304
4064	289	545	3296	1057	2784	2528	1825
4032	321	577	3264	1089	2752	2496	1857
97	3744	3488	865	2976	1377	1633	2208
3968	385	641	3200	1153	2688	2432	1921
161	3680	3424	929	2912	1441	1697	2144
193	3648	3392	961	2880	1473	1729	2112
3872	481	737	3104	1249	2592	2336	2017
16388	16388	16388	16388	16388	16388	16388	16388

Each of the sixty-four numbers given above will be at the upper left-hand corner of a square and its complement at the lower right-hand corner. The footings given are for these initial numbers,



but the arrangement of numbers in the squares is such that the footing will be the same for every one of the sixty-four columns in each cube. If the numbers in each horizontal line of the table above be added they will be found to have the same sum: consequently the squares headed by them must make a cube as nearly perfect as the example given in Fig. 5, which is cube I of the table above. But the sum of half the numbers in each line is half of 16388, and hence each of the eight cubes formed by taking the squares in the horizontal rows is capable of subdivision into 4-cubes and 2-cubes, like our original cube. We thus have sixteen cubes, each with the characteristics described for the one presented in Fig. 5.

If we pile the squares lying in the diagonal of our great square (starting with 1, 289, etc., or 2304, 2528, etc.) we find that its columns and cubic diagonals are not correct; but all the diagonals of its vertical squares are so, and even here the remarkable feature of the half-dimension persists.

Of course there is nothing to prevent one's going still further and examining constructions involving the fifth or even higher powers, but the utility of such research may well be doubted. The purpose of this article is to suggest in sketch rather than to discuss exhaustively an interesting field of study for some one who may have time to develop it.

H. M. KINGERY.

WABASH COLLEGE.

